

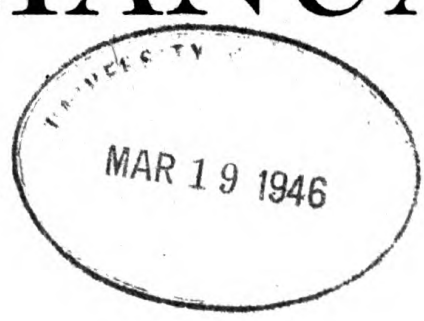
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WAR DEPARTMENT TECHNICAL MANUAL

U.S. Dept. of Army

GENERAL SAFETY MANUAL



WAR DEPARTMENT • JANUARY, 1946

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TM 20-350

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CHAPTER I

INTRODUCTION

Purpose

This manual is intended as a reference on matters pertaining to the prevention of accidents. It is designed especially for the guidance of safety officers and safety inspectors in making surveys of War Department areas, structures, equipment, and activities, and when checking operating procedures.

Scope

The material presented will be considered the minimum for normal operations, and may be supplemented with additional material as needed.

Information concerning War Department procedures on subjects such as safety program organization, accident reporting, accident report forms, and injury analyses, can be found in other War Department publications.

Definitions

Elements in the control of unsafe acts and conditions, as presented in this manual, are defined as follows:

1. *Safety standards.* Factors used as an accepted measure of quality, condition, or performance; ordinarily used as a guide in making safety inspections.
2. *Standard operating requirements.* Minimum conditions of safe operation; the direct responsibility of the installation, activity, or facility.
3. *Operating requirements.* Factors, either advisory or mandatory, considered necessary to safe operation; the direct responsibility of the installation, activity, or facility.
4. *Safe practices.* Factors of operation, having to do with performance; the direct responsibility of the soldier or employee.

Responsibility

Fundamentally, the responsibility for the operation of an *Army Safety Program* rests with the commanding officer of a War Department installation, the commanding officer of a detached unit, or unit in the field or in training, or the owner or operator of a privately-operated facility.

The success of a safety program is dependent on the quality of support rendered by command, or management, and the complete-

ness of integration of the program at all levels of command. Adherence to the requirements and practices presented, both in spirit and in fact, will provide a sound approach to successful operations.

In a theater of operations, necessity may require certain modification of the operating requirements set forth in this manual. However, when operations become stabilized they should conform to the manual requirements.

Theory of Accident Prevention

Accidental injuries cannot occur unless some person acts unsafely or is exposed to a mechanical or physical hazard. The principle that it is better to locate and correct unsafe conditions and unsafe acts before they cause an accident, rather than to determine such conditions or acts as having caused an injury or death, is recognized. Accident *prevention*, expressed in simple form, is the work of correcting unsafe acts of persons and unsafe mechanical or physical conditions. The most constructive and effective safety work is accomplished on recreation and drill fields, on highways, on conditioning courses, in vehicles, and in shops and depots. In short, the life of the safety program is the effective action that is taken, at operating levels, to control the acts of persons, and to correct unsafe conditions. All other activities in a complete safety program, although worthy, are incidental and but a means to the end—that of removing accident causes.

CHAPTER 2

SAFETY STANDARDS INSPECTION LIST

Section 1. ALL BUILDINGS (General)

Outside Doors and Steps

1. Doors leading to the outside should swing outward.
2. Doors should open on a landing at least the width of the door and not directly on a flight of stairs.
3. Threshold, landing, and steps should be in good condition. No broken or split treads should be permitted.
4. The riser of the stair should not be more than $7\frac{3}{4}$ inches in height and the tread not less than $9\frac{1}{2}$ inches exclusive of nosing. Nosing not less than 1 inch wide should be provided and the maximum pitch of the stairway should approximate 39° . Riser heights and tread widths should be identical.
5. A landing 18 inches or more above adjacent or surrounding levels should be provided with a substantial guard rail.
6. Steps should be kept cleared of all obstacles; if they become icy they should be cleared or sprinkled with sand or ashes.
7. Doors should be fitted with reliable hardware and readily opened from the inside.

Fire Prevention

1. Stoves and stove pipes should be insulated from floors, ceilings, and nearby walls. The aisles should be arranged so that the insulation will not cause a tripping hazard.
2. Furnace rooms should not be used for the storage of flammable waste materials or debris.
3. Good housekeeping should be maintained. Wall hooks should be provided for tools and implements.
4. Waste should not be allowed to accumulate. Any temporary accumulation of oily rags or flammable waste should be kept in covered metal receptacles.
5. Electric wiring should be maintained in good condition.
6. Fuse boxes should be in good condition. The use of makeshift fuses, such as copper pennies, should not be permitted. Fuse box should be sealed with a lead seal, but not locked.
7. Fire extinguishers should be sufficient in number, correct in type, and properly maintained. Placement should be made for visibility, availability in emergency, and avoiding hazard of trip-

ping over or striking against. Personnel should be familiarized with purposes and operations of various types of extinguishers by practice at time of refilling.

Other

1. Floors should be in good repair. A floor that has a tendency to splinter should be scraped, sanded, and treated to eliminate splintering. Floor treatments that tend to create slipping hazards should be avoided.
2. Windows should open and close freely.
3. Nails or hooks should not project from walls, floors, columns, or other locations, except when used in designated cases as hangers for tools or implements.
4. All electric light fixtures, particularly in showers, stairways, and other places with serious fall hazards, should be in operating condition. Those in showers should be remotely controlled.
5. Mop, broom, and scrub brush handles should be free of cracks and splinters. All equipment should be properly racked when not in use.
6. Floor openings should be properly guarded.

Section II. BARRACKS

Latrine

1. Duckboards should be provided in showers and properly fitted with side clearance not to exceed $\frac{1}{2}$ inch. Duckboards should be constructed of a tight-grained material, should be free of splinters, and the parts should be bolted or screwed in position.
2. Handrails should be provided in shower stalls.
3. Soap dishes in shower stalls should be located in nonhazardous positions.
4. Toilet seats should be securely fastened and free from cracks.
5. Lighting fixtures over wash bowls, laundry tubs, and showers should be keyless and remotely controlled.
6. Receptacles should be provided for razor blade disposal.
7. Wastebaskets should be provided.
8. Where floor level of latrine is below that of an entry, an inside landing should be provided so door does not swing over steps.

Storage Locker for Cleaning Materials

1. Storage lockers should be maintained neatly and should not contain greasy rags, flammables, loose razor blades, broken glass, or other hazardous articles.
2. Ventilation should be provided at top and bottom of the locker.

Fire Ladder and Balcony

1. Balcony and railing should be substantially built and kept in sound condition.
2. Ladders should be in good repair with all rungs firmly in place.
3. Doors should swing out and away from ladder.
4. Doors should not be locked or nailed shut.

Inside Stairs, Steps, or Ramps

1. Stairs should be in good repair with no broken or split treads and maintained in nonslippery condition.
2. Handrails should be substantial and smooth, installed on one side (right side descending) if stair or ramp width is under 44 inches, on both sides if over 44 inches. The height of handrails should be not more than 34 inches nor less than 30 inches from upper surface of handrail to surface of tread in line with face of riser or to surface of ramp.
3. Posters should not be allowed on walls of stairways or so placed as to distract persons using stairs or ramps.

Other

1. Overhead storage platforms should be substantially constructed, with railguards and toe boards on the open sides, safe access provided and the safe carrying capacity *per square foot* of platform posted. No stairwell should be used for storage purposes.
2. Drinking fountain heads should be so installed that the mouth cannot come in direct contact with the discharge orifice.
3. Cigarette butt-cans, adequate in number and free of sharp edges, should be provided at convenient locations.

Section III. SUPPLY ROOM

Storage and Shelving

1. Shelving should be strong, well designed, properly backed, free of splinters and projecting nails, securely fastened to the wall, and in good repair.
2. Safe methods of stacking material should be followed at all times. Overhead stacking should be limited to light objects.
3. Heavier materials should be stored on lower shelves.
4. Materials used most often should be stored in readily accessible places.
5. Racks should be provided for supplies of brooms, mops, pokers, and other equipment.
6. Ladders (preferably platform type) should be provided for use in working on higher shelves.
7. A clear space of 18 inches should be maintained below the ceiling, or beams, or sprinkler heads.

Tools

1. Maintenance:

- a. Hammers, chisels, and other shock tools should be free from checking and mushrooming.
- b. Handles of all tools should be firmly attached and free of cracks and splinters. Handles should be on all files.
- c. Wrench and plier jaws should be in good condition.
- d. Cutting tools should be sharp and properly ground, including a proper degree of sharpness on pickaxes and crowbars.
- e. Screw drivers should have good handles and blades. (A broken handle or blade indicates misuse.)
- f. Ladders should be in good condition.

2. Storage:

- a. Tools should be stored for ready identification and availability.
- b. Cutting edges of tools should be protected.
- c. Shovels, rakes, and other long handled tools should be stored on suitable racks or hooks.
- d. Falling of tools, particularly heavy or sharp edged tools, should be guarded against; for example, crowbars should lay flat and in a position from which rolling or falling by accidental dislodgment is impossible.
- e. Rope should be stored in loose coils exposed to air and away from acids, dampness, and high temperatures.

Flammables

1. Flammables, including paints and uncleaned paint brushes, should be segregated from other material or stored in an outside shed away from other buildings.
2. Containers for flammables should be suitably marked.

Special Storage Rooms

1. Barracks rooms, when used for storage, should be treated as supply rooms.
2. Overloading of floors should be avoided. Maximum allowable floor loads should be posted.
3. Heavy storage should be located over principal structural members, aisles located where support is weakest.

Other

1. Housekeeping of the highest order should be maintained at all times.
2. All equipment should be in good repair.
3. Scrap lumber should be free of nails and neatly piled.

Section IV. ORDERLY ROOM

See section II, chapter 4.

Section V. DAY ROOM

1. Empty beverage bottles should be placed in cases, which should be piled not over six cases high.
2. Adequate room should be provided for ping-pong or other games so that body collisions with building parts or furniture may be avoided.
3. All furniture and equipment should be in good repair.
4. Sufficient ash trays should be provided and conveniently located.
5. Tables should be substantial and free of splinters.

Section VI. COMPANY AREA

1. Materials should not be piled against or stored under buildings.
2. Isolated rocks or stakes should not be placed on walkway borders.
3. Roads and walks should be properly maintained.
4. Walkway railings or appropriate warning signs should be provided adjacent to holes and ditches 18 inches or more in depth.
5. Clothes lines should not be less than 6 feet above ground.
6. Bushes, billboards, or other objects should not obstruct view of approaching vehicles or pedestrians at intersections. Traffic control devices should be used where called for by good safety engineering practices.

CHAPTER 3

STANDARD OPERATING REQUIREMENTS

Section I. COLOR MARKING

This safety color code defines the application of colors to specific purposes in connection with accident prevention and designates the colors to be used for such purposes. It is not the intent of this code to be in conflict with any generally accepted standards or regulations with respect to the use of color or shape of markers in sea or air navigation, or in railroad or highway transportation.

Utilization of this code will be effected on installation of any new element set forth herein, and on a maintenance basis for such elements currently in use.

Red

Red will be used as the basic color for identification of:

1. *Fire protective equipment and apparatus:*

- a. Fire alarm boxes (pull boxes).
- b. Fire blanket boxes.
- c. Fire buckets or pails.
- d. Fire extinguisher. (If painting of extinguisher is undesirable, color will be used on housing wall or support to identify location.)
- e. Fire hose locations.
- f. Fire pumps.
- g. Fire sirens.
- h. Fire hydrants and post indicator valves for sprinkler system. (If a traffic hazard is involved, the top will be colored red and the barrel or post yellow and black stripes.)
- i. Sprinkler piping.

2. *Danger:*

- a. Safety cans or other portable containers of flammable liquids (excluding shipping containers and so called blitz cans listed as "drum, inflammable liquid (gasoline), steel with carrying handles, 5-gallon" or "drum, gasoline, 5-gallon, can closure") will be painted red with some additional clearly visible identification either in the form of a yellow band around the can or the name of the contents stenciled or painted on the can.

- b. Danger signs (See American Safety Standard Specifications for Industrial Accident Prevention Signs, Z35.1-1941, or the latest addition thereof.)
 - c. Red lights of barricades, temporary obstructions, and on temporary construction.
3. *Stop:*
- a. Stop buttons for electrical switches used for emergency stopping of machinery.
 - b. Emergency stop bars on hazardous machines such as rubber mills, wire blocks, and flat work ironers.

Yellow

Yellow will be used as the basic color for designating caution, for marking physical hazards such as: striking against, stumbling, falling, tripping and "caught in between." The following is a partial list of examples where solid yellow, yellow and black stripes, or yellow and black checkers will be used interchangeably in accordance with whichever will create the best attention in the particular environment:

1. *Caution:*

- a. Inside of covers of switch and fuse boxes.
- b. Inside of transmission guards for gears, pulleys, and chains.
- c. Inside of movable hood guards such as picker guards in textile plants.
- d. Handrails, guardrails or top and bottom treads of stairways where caution is needed.
- e. "Caution" signs (see American Standard Specification for Industrial Accident Prevention Signs, Z35.1-1942, or the latest revision thereof).
- f. Piping systems containing dangerous materials (see American Recommended Practice Scheme for Identification of Piping, A13-1928 or the latest revision thereof).
- g. Waste containers for explosive or highly combustible materials should have a yellow band around the container. The width of the band should not be more than one-third the height of the can. Wording to indicate the contents should be painted on the yellow band in large red letters such as: "EXPLOSIVE," "COMBUSTIBLE," or the name of the material in the container.

2. *Physical hazards:*

- a. Industrial locomotives (or areas thereon).
- b. Material handling equipment (or areas thereon) such as industrial tractors, trucks, trailers, forklifts, conveyors, and gantry trucks.

- c. Construction equipment (or areas thereon) such as bulldozers, tractors, and carryalls.
- d. Lower pulley blocks and cranes.
- e. Coverings and guards for guy wires.
- f. Stripe along sides of freight-car-loading plates or runways.
- g. Pillars, posts, or columns which might be struck.
- h. Fixtures suspended from ceilings or walls which extend into normal operating areas (within the clearance diagram of plant traffic).
- i. Corner markers for storage piles.
- j. Projections, doorways, traveling conveyors, low beams and pipes, and the frames of elevator ways and elevator gates.
- k. Lips on horizontally closing elevator doors.
- l. Exposed and unguarded edges of platforms, pits and wells.

Green

Green will be used as the basic color for designating safety, location of first aid and first aid equipment (other than fire fighting equipment), and traffic to proceed. The following is a partial list of examples where solid green, green and white stripes, green cross on white background or white cross on green background will be used in accordance with local conditions:

1. *First aid:*

- a. Location of first-aid equipment.
- b. Location of first-aid dispensaries.
- c. Location of gas masks.
- d. Location of stretchers.
- e. Safety deluge showers. A predominance of white color to aid visibility is preferable.

2. *Traffic:*

- a. "Proceed" signs or signals.
- b. Exit signs—unless there are legal requirements to the contrary.

3. *Other:*

- a. Safety starting buttons such as inching buttons on dough mixers, metal planers, boring mills and laundry washers.
- b. Safety bulletin boards.
- c. Safety instruction signs.

Black and White

Black and white will be used as the basic colors for designating housekeeping and traffic markings. The following is a partial list of examples where solid white, solid black, single color strip-

ing, alternate stripes of black and white, or black and white checkers will be used in accordance with local conditions:

1. *Traffic:*

- a. Location and width of aisleways.
- b. Dead ends of aisles or passageways.
- c. Stairways (particularly the bottom and top treads and risers).
- d. Direction signs.

2. *Housekeeping:*

- a. Location of refuse cans.
- b. White corners for rooms or passageway.

Section II. SANITARY CONVENIENCES

Water Supply

1. There will be provided at all places of employment a supply of clean, cool, wholesome, safe drinking water, approved by the medical officer, and dispensed by sanitary methods.
2. Where sanitary drinking fountains are provided, they will be of approved type and construction. At least one drinking fountain should be provided for each 50 individuals.
3. The common drinking cup will be prohibited. When individual drinking cups (to be used only once) are supplied, a suitable container will be provided for the unused cups and a receptacle for the disposal of used cups.
4. Open containers for drinking water from which the water must be dipped or poured will not be allowed.
5. Where water from an unimproved source is used for industrial processes or fire protection, notices will be posted stating clearly that such water is unsafe for drinking and every reasonable effort will be made to prevent such use.

Waste Disposal

1. Waste receptacles of a type which can be kept clean and sanitary will be provided at all places of employment.
2. An adequate number of waste receptacles, of a type suitable for the purpose, will be provided in and near all eating places or areas.
3. Waste receptacles will be covered unless they contain nothing which will attract flies, other insects, or rodents.
4. All waste receptacles will be emptied and cleaned in a manner approved by the medical officer.
5. All waste will be collected periodically and disposed of in a manner approved by the medical officer.

Washing Facilities

1. Adequate facilities for maintaining personal cleanliness will be provided at every place of employment and will be maintained in a sanitary condition throughout.
2. At least one lavatory (wash basin) with adequate water supply will be provided for every 10 persons or portion thereof up to 100 persons, and one lavatory for each additional 15 persons or portions thereof. At least one lavatory will be provided in each toilet room or room adjacent thereto unless general washing facilities are on the same floor and near the toilet room.
3. The common towel shall be prohibited. Individual towels of cloth or paper and proper receptacles for disposing of used towels will be provided.

Toilet Facilities

1. Every place of employment will be provided with adequate water closets, chemical closets, or privies, separate for each sex, in accordance with the following table in which the number of persons for which facilities are required is the maximum number of *each sex* employed at any time on the premises:

Number of persons (each sex)	Minimum number of toilet facilities required
1 to 9	1
10 to 24	2
25 to 49	3
50 to 100	5
over 100	1 for each additional 30 persons.

2. Chemical closets and privies will not be permitted except where no sewer is accessible and only when they can be kept under careful supervision.
3. When urinals are provided, the number of closets required for males may be one less, for each urinal, than the number otherwise specified in the above table, except that the number of closets in such cases will not be reduced to less than two-thirds the number specified in the table. Where trough urinals are provided, each 2 feet of space is considered equal to one urinal.
4. All toilet facilities will be maintained clean and sanitary at all times. Instructions of the medical officer will be used in providing cleaning and disinfecting service.
5. On all field activities where the usual toilet facilities are not available, sanitation discipline, as outlined by the medical officer, will be enforced.

Section III. MACHINE GUARDS

General—Standards under this heading relate specifically to point-of-operation hazards presented by certain industrial machines commonly used in military installations. No attempt has been made to include all such machines. For machines not specifically mentioned, enforcing authority should require treatment comparable to that listed below. In all cases wide latitude in allowing the use of other devices which afford adequate protection should be exercised. It is not intended that these standards will limit compliance with applicable Federal, state, and local requirements where such requirements exceed those herein.

Woodworking Machines

1. *Circular, rip, crosscut, resaw, and swing cut-off saws.*

a. *Guarding of saws beneath and behind tables.* For all circular saws where there is a possibility of contact with the portion of the saw either beneath or behind the table, that portion of the saw will be covered with an exhaust hood or if no exhaust system is required, then with a guard that will prevent accidental contact with the saw.

b. *Hand-fed rip saws.*

(1) *Hoods.* Each circular hand-fed rip saw will be guarded by a hood which will completely enclose that portion of the saw above the table, and that portion of the saw above the material being cut. The hood and mounting will be so arranged that the hood will automatically adjust itself to the thickness of and remain in contact with the material being cut, but it will not offer any considerable resistance to insertion of material to saw or of passage of material being sawed. The hood will be of adequate strength to resist blows and strains incidental to reasonable operation, adjusting, and handling, and will be designed to protect the operator from flying splinters and broken saw teeth. It will be of material that is soft enough to be unlikely to cause tooth breakage. The material should not shatter when broken, should be nonexplosive, and should be no more flammable than wood. The hood will be so constructed and aligned that the operator can see his line of cut when he is in proper position to feed the saw.

The hood will be mounted in a manner to insure its operation to be positive, reliable, and in true alignment with the saw; and the mounting will be adequate in strength to resist any reasonable side thrust or other force tending to throw it out of line.

- (2) *Spreaders.* Each hand-fed circular rip saw will be furnished with a spreader to prevent material from squeezing the saw or being thrown back on the operator. The spreader will be made of saw steel or tool steel (or its equivalent) that has been hardened, tempered, and ground to gauge so that it is thinner than the saw kerf but thicker than the saw blade. It will be of sufficient width to provide adequate stiffness or rigidity to resist any reasonable side thrust or blow tending to bend or throw it out of position. The spreader will be so attached as to remain in true alignment with the saw even when either the saw or table is tilted and should be so placed that there is not more than 1/2-inch space between the spreader and the back of the saw when the largest saw is mounted in the machine.

The provision of a spreader in connection with grooving, dadoing, or rabbeting is not required. On the completion of such operations, the spreader will be immediately replaced.

- (3) *Nonkickback fingers or dogs.* Each hand-fed circular rip saw will be provided with one or more nonkickback fingers or dogs mounted on the hood and so located as to oppose the thrust or tendency of the saw to pick up the material or to throw the material back toward the operator. They will be designed to provide adequate holding power for any thickness of material being cut.

c. Hand-fed crosscut table saws (including trimmer saws)

- (1) Each circular crosscut table saw will be guarded by a hood which will meet all the requirements of 1b(1) above for hoods for circular rip saws.
- (2) Each circular crosscut saw will also be provided with a spreader which will meet all the requirements of 1b(2) above.
- (3) Hoods for trimmer saws with mechanical feed will remain in contact with the material being cut.

d. Revolving double arbor saws. Revolving double arbor saws will be fully guarded in accordance with all of the requirements for circular crosscut saws or with all of the requirements for circular rip saws according to the kind of saws that are mounted on the arbors.

e. Circular resaws.

- (1) Each circular resaw will be guarded by a hood or shield of metal above the saw. Such hood or shield will be designed to protect the operator from flying splinters and broken saw teeth.

- (2) Each circular resaw (other than self-feed saws with a roller or wheel at back of the saw) will be provided with a spreader fastened securely behind the saw. The spreader will be slightly thinner than the saw kerf and slightly thicker than the saw blade.

f. Self-feed circular saws.

- (1) *Hoods.* Feed rolls and saws will be protected by a hood or by semicylindrical guards to prevent the hands of the operator from coming in contact with in-running rolls at any point. The guard will be constructed of heavy material, preferably metal, and the bottom of the guard will come down to within $\frac{3}{8}$ inch of the plane formed by the bottom or working surfaces of the feed rolls.
- (2) *Nonkickback fingers.* Each self-feed circular rip saw will be provided with sectional nonkickback fingers for the full width of the feed rolls. They will be located in front of the saw.

g. Swing cut-off saws. The requirements of this heading are also applicable to sliding cut-off saws mounted above the table.

- (1) *Hood.* Each swing cut-off saw will be provided with a hood that will completely enclose the upper half of the saw, the arbor end, and the point of operation at all positions of the saw. The hood will be constructed in such a manner and of such material that it will protect the operator from flying splinters and broken saw teeth and will afford the operator a clear view of the cutting edge of the saw.

The hood will be hinged at the back and provided with an extension at the front so that, when the saw is returned to the back of the table, the hood will rise on top of the fence; and when the saw is moved forward, the hood will drop on top of, and remain in contact with, the material being cut.

- (2) *Counterweights.* Each swing cut-off saw will be provided with an effective device to return the saw automatically to the back of the table when released at any point of its travel. Such device will not depend for its proper functioning upon any rope, cord, or spring. If there is a counterweight, the bolts supporting the bar and counterweight will be prevented from dropping by either a bolt passing through the extreme end of the bar, or, where the counterweight does not encircle the bar, a safety chain attached to it.

(3) *Limit stops.* Limit chains or other equally effective devices will be provided to prevent the saw from swinging beyond the front or back edges of the table, or beyond a forward position where the gullets of the lowest saw teeth will rise above the table top.

(4) *Latches.* A latch will be provided to catch and retain the saw at the rear of the table and to prevent its rebounding.

h. *Inverted swing cut-off saws (jump saws).* Inverted swing cut-off saws will be provided with a hood that will cover the part of the saw that protrudes above the top of the table or above the material being cut. It will automatically adjust itself to the thickness of and remain in contact with the material being cut.

i. *Portable circular saws.* All portable power-driven saws will be equipped with guards which will automatically adjust themselves to the work, when in use, so that none of the teeth are exposed to contact above the work; and when withdrawn from that work, the guard will completely cover the saw to the depth of the teeth. A spreader should be attached on all such saws.

2. *Band saws and band resaws.*

a. *Enclosing band-saw blades.*

(1) All portions of the saw blade will be enclosed or guarded, except the working side of the blade between the guide rolls and the table. Band-saw wheels will be fully encased. The outside periphery of the enclosure will be solid. The front and back of the band wheels will be either enclosed by solid material, or wire mesh expanded, or perforated metal. Such mesh or perforated metal will be not less than 0.037 inch (U.S. Gauge No. 20) and the openings will be not greater than $\frac{3}{8}$ inch. Solid material used for this purpose will be of an equivalent strength and firmness.

(2) The guard for the portion of the blade between the sliding guide and the upper-saw-wheel guard will either enclose the saw blade or protect the saw at the front and both sides. This portion of the guard will be self-adjusting to raise and lower with the guide. The upper-wheel guard will be made to conform to the travel of the saw on the wheel and the top member of the guards should have at least a 2-inch clearance outside the saw and be lined with smooth material, preferably metal.

- b. *Automatic tension.* Each band-saw machine will be provided with an automatic tension control device to prevent breakage of new blades due to improper tension.
- c. *Feed rolls.* Feed rolls of band resaws shall be protected with a semicylindrical guard to prevent the hands of the operator from coming in contact with in-running rolls at any point. The guard will be constructed of heavy material, preferably metal, and the edge of the guard shall come within $\frac{3}{8}$ inch of the plane formed by the inside face of the feed roll in contact with the stock being cut.

3. *Jointers.*

- a. *Point of operation.* Each hand-fed planer and jointer with horizontal head will be equipped with a cylindrical cutting head, the throat of which will not exceed $\frac{7}{16}$ inch in depth nor $\frac{5}{8}$ inch in width. It is strongly recommended that no cylinder be used in which the throat exceeds $\frac{3}{8}$ inch in depth or $\frac{1}{2}$ inch in width.
- b. *Automatic guards.*
 - (1) Each hand-fed jointer with a horizontal cutting head will have an automatic guard which will cover all the section of the head on the working side of the fence or gauge. The guard will automatically adjust horizontally for edge jointing and vertically for surface work, and will remain in contact with the material at all times.
 - (2) Each hand-fed jointer with horizontal cutting head will have a guard which will cover the section of the head back of the gauge or fence.
- c. *Vertical-head jointers.* Each wood jointer with vertical head will have either an exhaust hood or other guard so arranged as to enclose completely the revolving head, except a slot of such width as may be necessary and convenient for the application of the material to be jointed.

4. *Tenoning machines.*

a. *Guarding of cutting heads.*

- (1) Each tenoning machine will have all cutting heads, and saws if used, covered by metal guards. These guards will cover at least the unused part of the periphery of the cutting head. If such guard is constructed of sheet metal, the material used will be not less than $\frac{1}{16}$ inch in thickness; and if cast iron is used, it will be not less than $\frac{3}{16}$ inch in thickness.

Note. It is not contemplated that the above hoods will retain a thrown or broken knife.

- (2) Where an exhaust system is used, the guard will be constructed of metal of a thickness not less than the above.
- b. *Feed chains and sprockets.*
 - (1) Feed chains and sprockets of all double end tenoning machines will be completely enclosed, except that portion of chain used for conveying the stock.
 - (2) At rear ends of frames over which feed conveyors run, sprockets and chains will be guarded at sides by plates projecting beyond periphery of sprockets and ends of lugs.
 - (3) Where space permits, the rear end of the frame over which the feed conveyors run will be so extended that the material as it leaves the machine will be guided to a point within easy reach of the person "taking away" at the rear of the tenoner.
- c. *Hand-fed tenoners.* Hand-fed tenoning machines should be provided with a clamping or "hold-down" device to help the operator to hold the material being cut.
- 5. *Boring and mortising machines.*
 - a. *Chucks.* Safety-bit chucks will have no projecting setscrews.
 - b. *Boring bits.* Boring bits will be provided with a guard that will enclose all portions of the bit and chuck above the material being worked.
 - c. *Chain mortiser.* The top of the cutting chain and driving mechanism will be enclosed.
 - d. *Counterweights.* If there is a counterweight, one of the following, or equivalent, means will be used to prevent its dropping:
 - (1) It will be bolted to the bar by means of a bolt passing through both bar and counterweight;
 - (2) A bolt will be put through the extreme end of the bar;
 - (3) Where the counterweight does not encircle the bar, a safety chain will be attached to it;
 - (4) Other types of counterweights will be suspended by chain or wire rope and will travel in a pipe or other suitable enclosure wherever they might fall and cause injury.
 - e. *Universal joints.* Universal joints on spindles of boring machines will be completely enclosed to prevent injury to operator.
 - f. *Guarding operating treadles.* Each operating treadle will be covered by an inverted U-shaped metal guard, fastened to the floor, of adequate size to prevent accidental tripping.

6. *Wood shapers, etc.*

- a. *Guarding of cutting heads.* The cutting heads of each wood shaper, hand-fed panel raiser, or other similar machine not automatically fed, will be enclosed with a cage or adjustable guard so designed as to keep the operator's hands away from the cutting edge. The diameter of circular shaper guards will be not less than the greatest diameter of the cutter. In no case will a warning device of leather or other material attached to the spindle be acceptable.

Cylindrical heads will be used wherever the nature of the work will permit. Templates, jigs, and fixtures which will remove the operator's hands from the point of operation should be used wherever the nature of the work will permit.

- b. *Spindle starting and stopping devices.* All double-spindle shapers will be provided with a spindle starting and stopping device for each spindle.

7. *Planing, molding, sticking, and matching machines.*

- a. *Guarding of cutting heads.*

- (1) Each planing, molding, sticking, and matching machines will have all cutting heads, and saws if used, covered by a metal guard. If such guard is constructed of sheet metal, the material used will be not less than $\frac{1}{16}$ inch in thickness; and if cast iron is used, it will be not less than $\frac{3}{16}$ inch in thickness.

Note. It is not contemplated that the above hoods will retain a thrown or broken knife.

- (2) Where an exhaust system is used, the guards will form part or all of the exhaust hood and will be constructed of metal of a thickness not less than the above.

- b. *Feed rolls.*

- (1) Feed rolls will be guarded by a hood or a semicylindrical guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard will be fastened to the frame carrying the rolls so as to remain in adjustment for any thickness of stock.
- (2) Sectional feed rolls will be provided for planers.
- (3) Where solid feed rolls are used, sectional finger devices will be used to prevent kickbacks.

8. *Profile and swing-head lathes (including wood heel turning machines).*

- a. *Guarding of cutting heads.*

- (1) Each profile and swinghead lathe will have all cutting heads covered by a metal guard. If such guard is constructed of sheet metal, the material used will be not less

than $\frac{1}{16}$ inch in thickness ; and if the cast iron is used, it will be not less than $\frac{3}{16}$ inch in thickness.

Note. It is not contemplated that the above hoods will retain a thrown or broken knife.

- (2) Where an exhaust system is used, the guard will form part or all of the exhaust hood and will be constructed of metal of a thickness not less than the above.

9. *Sanding machines.*

- a. *Feed rolls.* Feed rolls of self-feed sanding machines will be protected with a semicylindrical guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard will be constructed of heavy material, preferably metal, and firmly secured to the frame carrying the rolls so as to remain in adjustment for any thickness of stock. The bottom of the guard should come down to within $\frac{3}{8}$ inch of a plane formed by the bottom or contact face of the feed roll where it touches the stock.
- b. *Drum sanding machines.* Each drum sanding machine will have an exhaust hood (or other guard if no exhaust system is required) so arranged as to enclose the revolving drum, except such portion of the drum above the table, if table is used, as may be necessary and convenient for the application of the material to be finished.
- c. *Disk sanding machines.* Each disk sanding machine will have the exhaust hood (or other guard if no exhaust system is required) so arranged as to enclose the revolving disk, except such portion of the disk above the table, if table is used, as may be necessary for the application of the material to be finished.
- d. *Belt sanding machines.* Each belt sanding machine will have both pulleys enclosed so as to guard the points where the sanding belt runs onto the pulleys. The unused run of the sanding belt shall be enclosed.

10. *Miscellaneous machines.*

- a. *Combination or universal woodworking machines.* For combination or universal woodworking machines each point of operation of any tool will be guarded as required for such tool in a separate machine. Such machines will be provided with a separate stopping and starting device for each point of operation.
- b. *Other machines.* Point of operation hazards presented by woodworking machines not specifically mentioned herein will be guarded against by providing appropriate protective devices.

Metalworking Machines

1. *Abrasive wheels.* The term "abrasive wheels" as used in this standard refers to power-driven wheels consisting of abrasive particles held together by artificial or natural mineral or organic bonds. The term is not intended to include metal, wooden, cloth, or paper wheels or disks having a layer or layers of abrasive on the surface. With the exception of wheels used for internal grinding and of wheels 3 inches or less in diameter running at peripheral speed not exceeding 3,000 feet per minute, every abrasive wheel should be equipped with one of the following devices:

a. *Protection hoods.*

- (1) A protection hood will always be used with an abrasive wheel which is not equipped with protection flanges, bands, or chucks.
- (2) Each hood will be so mounted as to maintain proper alignment with its wheel. The strength of the hood supports and fastenings should exceed the strength of the hood.
- (3) In general, the hood will enclose the spindle end, nut, and flange projections. However, protection hoods on cylindrical grinding machines, in all operations where the work provides a suitable measure of protection to the operator, may be so constructed that the spindle end, nut, and flange are exposed. Where the nature of the work is such as to entirely cover the side of the wheel, the side covers of the guard may be omitted.
- (4) Hoods will be so constructed that it is not necessary, when changing wheels, to detach the peripheral protecting member from the side member which is connected to the machine.
- (5) Hoods on machines used for dry grinding and for other dust-producing operations should be properly connected to an adequate exhaust system.

b. *Flanges and protection flanges.*

- (1) All abrasive wheels shall be mounted between flanges, except those wheels which are mounted in chucks, cemented to metal back or otherwise securely and adequately mounted on spindles. In general, flanges may be of the straight type or of the tapered type. So-called straight flanges, adaptor flanges, and sleeve flanges, for use with straight-sided wheels, are not protection flanges and should be used only in combination with protection hoods.

- (2) Protection flanges will be used with wheels which are not equipped with hoods, bands, or chucks. The tapered type should be used wherever possible.

c. Protection bands.

- (1) Protection bands will be used with cup, cylinder, and sectional ring wheels which are not protected by hoods or enclosed in protection chucks. The bands will be made of wrought iron, steel plate, or their equivalent, and will be continuous and bent to conform closely to the periphery of the wheel. The ends will be so riveted, bolted, or welded together as to leave the inside of the band free from projections.
- (2) The thickness of the band will be not less than $\frac{1}{16}$ inch for wheels under 8 inches in diameter, not less than $\frac{1}{8}$ inch for those 8 to 24 inches in diameter, and not less than $\frac{1}{4}$ inch for those 24 to 30 inches in diameter.
- (3) The bands will be of such width that not more than one-quarter of the original height of a wheel protrudes beyond the protection provided. For wheels less than 2 inches thick, the maximum distance which the wheel may protrude will not be greater than the thickness of the rim. If the thickness of the rim is 2 inches or more, the wheel will not protrude more than 2 inches.

d. Protection chucks. Where the chuck which holds the wheel is the only protection provided, it should be so constructed that the jaws will at all times protect the wheel up to the point herein recommended for protection bands.

2. *Presses.* The machines included in this group may be divided into two general classes—one consisting of power presses and the other consisting of foot or hand presses.

- a. Power presses.* Any power press not equipped with a fully automatic feed will be equipped with a nonrepeat device, meaning an arrangement which disconnects the treadle or lever (if hand operated) from the clutch mechanism after each stroke, or a device that will, within its own action, automatically lock the clutch mechanism into place so that the press cannot make a second stroke until the treadle or hand lever is again pressed to its lowest position, unless the arrangement is such that the guard remains in its protective position during the second stroke of the press. To attain a standard of operation comparable to this requirement, one of the following devices or arrangements (ar-

ranged in two groups, the first of which is preferable) will be in effect on each press:

Group 1.

- (1) There will be a fully automatic feed of such character that the services of an operator are required only at intervals and then only to restock the feeding device or magazine.
- (2) There will be a guarded *sémiautomatic* or mechanical feed, that is, a dial feed, slide feed, push feed, rotating feed, or other similar device actuated by or attached to the machine, by means of which stock is fed under the plunger without it being necessary for the operator to place it there, and which includes a guard, enclosure, or barrier in front of the plunger.
- (3) The press will be so constructed that the distance traveled by the plunger is not more than $\frac{3}{8}$ inch.
- (4) For hand feed, there will be a fixed guard or enclosure entirely surrounding the plunger and so arranged that a finger cannot go under or over it and be injured by the plunger.

Group 2.

- (1) There will be a semiautomatic or mechanical feed, that is, a dial feed, slide feed, push feed, rotating feed, or other similar device actuated by or attached to the machine, by means of which stock is fed under the plunger without it being necessary for the operator to place it there.
- (2) There will be a gate guard, that is, a guard or gate operated by the tripping device of the press, which interposes a barrier in front of the plunger before the latter descends, and which will not permit the press to operate until the hand of the operator has been removed to a safe distance from the plunger.
- (3) There will be a sweep guard, that is, a device, mechanically operated by the press, which pushes the operator's hands out of the way of the plunger as the latter descends. This guard should be used only when it is impossible to install any other.
- (4) There will be a two-hand device, that is, an arrangement whereby hands, instead of feet, are used to trip the press and whereby the tripping of the press requires the simultaneous action of the operator's two hands at points outside of the zone of danger.

- (5) There will be an arm-operated guard, that is a device actuated by the operator's arm in feeding the press and so arranged as to prevent the operation of the clutch mechanism while the hand is placing or removing stock.
 - (6) There will be a fixed guard or enclosure across the front and along both sides of the plunger, so arranged that a finger cannot go under or over it and be injured by the plunger while stock is being fed.
 - (7) There will be a mechanical device with attachments to the operator's wrists which will not permit operator's hand to be in the danger zone while ram is in lower position.
- b. *Foot or hand presses.* Foot or hand-operated presses will be equipped with one of the following devices or arrangements:
- (1) An automatic feed, as described in *a*, group 1(1) above.
 - (2) A limited plunger travel, as described in *a*, group 1(3) above.
 - (3) A gate guard, as described in *a*, group 2(2) above.
 - (4) A sweep guard, as described in *a*, group 2(3) above.
 - (5) A two-hand device, as described in *a*, group 2(4) above.
 - (6) A fixed guard, as described in *a*, group 2(6) above.
3. *Punches.* A plate or sheet metal punch will be equipped with a device which will prevent fingers from coming between the punch and the die.
4. *Rolls.* The in-running side of rolls such as are used for corrugating, crimping, embossing, printing, or graining metal will be protected by a guard so arranged that material can be fed to the rolls without permitting the fingers of the operator to be caught between the rolls or between the guard and the rolls.
5. *Saws.* Circular saws having well-defined teeth, and especially high-speed saws of that type will be equipped with hoods which, in each case, will cover the saw at all times to at least the depth of the teeth. It may not be essential to thus guard low-speed saws, saws used on hot work, or friction saws.
6. *Shears.* For shears driven by mechanical power or by foot or hand power, a guard or device will be in use which will prevent the hands of the operator from entering the zone traveled by the knives of the shears while the knives are in motion. This may be a fixed barrier, a gate, or a sweep motion device or it may consist of a nonrepeat device plus a starting device requiring the simultaneous use of the operator's two hands at points outside the danger zone.

7. *Milling machines.* The cutters on every milling machine should be shielded by a guard which provides a positive protection for the operator's hands.

8. *Planers.* The planer bed will be equipped with covers which will prevent injury by shears between the carriage and the planer bed. The clearance at each end of the planer should be at least 3 feet when the carriage is at the end of its travel.

Bakery and Kitchen Machinery

1. *Dough brakes.* The rolls will be so enclosed that it will be impossible for the operator's hands to come in contact with them while he is feeding the machine.

2. *Dough mixers.* One of the following devices or arrangements will be in effect in each mixer which presents a shearing or crushing hazard between its blades, or between the blades and the barrel:

a. For the nontilting type, there will be a fixed cover and the feed to and discharged from the mixer should be valve-controlled, or there will be a removable cover and an interlocking device so arranged that power cannot be applied to the blades unless the cover is in place on the mixer.

b. For the tilting type, there will be a cover and an interlocking device so arranged that power cannot be applied to the blades unless the cover is in place on the mixer, or there will be a device which automatically cuts off the power when the bowl is in the tilted (unloading) position, together with a substantial stationary cover which closes the bowl when it is in the mixing position. With the power cut off, an auxiliary device may be used to power-operate the blades while the bowl is in the tilted position if the device functions only while the operator's hand is on the power control.

3. *Meat choppers.* The knives or choppers will be so enclosed or covered that the operator's hand cannot come in contact with them.

4. *Meat grinders.* On each such machine there will be a hopper of such size and arrangement that the operator's hand cannot come in contact with the cutting or feeding knives or the worm.

Laundry Machines

1. *Tumblers, shakers and washing machines.*

a. Each drying tumbler, each double-cylinder shaker or clothes tumbler, and each washing machine will be equipped with an interlocking device which will prevent the inside cylinder from moving when the door on the outer case or shell is open and which will also prevent the door from being

opened while the inside cylinder is in motion. This should not prevent the movement of the inner cylinder by means of a hand-operated mechanism or an "inching device."

- b. Each drying tumbler, each double cylinder shaker or clothes tumbler and each washing machine will be equipped with adequate means for holding open the doors or covers of the inner and outer cylinders or shells while it is being loaded or unloaded.
- c. Each single-cylinder shaker or clothes tumbler will be equipped with a device which will automatically prevent the tumbler from moving while the door is open. The tumbler should also be enclosed or guarded so as to prevent accidental contact with it while the machine is in motion.

2. *Extractors.*

Each centrifugal extractor will be equipped with a metal cover and with an interlocking device which will prevent the cover from being opened while the basket is in motion and which will also prevent the power operation of the basket while the cover is open. This should not prevent the movement of the basket by hand to insure even loading.

3. *Ironers.*

- a. Each body ironer of the roll or shoe type, including sleeve and band ironers, will be equipped with a bar or other equally effective guard extending across the entire length of the feed roll or shoe and so arranged that the striking of the bar or guard by the hand will stop the machine. The hot roll or shoe will be so covered that the operator cannot come in contact with the heated surfaces.
- b. Each flat-work or collar ironer will be equipped with a bar or other equally effective guard extending across the entire front of the feed or first pressure rolls and so arranged that the striking of the bar or guard by the hand will stop the machine. The pressure rolls will be covered or guarded so that the operator cannot reach into the rolls without removing the guard. Either a vertical guard on all sides or a complete cover may be used. If a vertical guard is used, the distance from the floor or working platform to the top of guard should be not less than 6 feet.
- c. Each ironing press (except hand or foot power presses) will be equipped with a guard which will prevent the fingers of the operator being caught between the ironing surfaces.
- d. Each combined rotary bosom and coat ironer will be equipped with a bar or other equally effective guard extending across the entire length of the feed roll or shoe and so

arranged that the striking of the bar or guard by the hand will stop the machine. The hot roll or shoe will be so covered that the operator cannot come in contact with the heated surfaces.

4. *Starching machines.* Each starching machine of the cylinder or box type will be enclosed or guarded so as to prevent the operator from coming into contact with the cylinder or box while the machine is in motion.

CHAPTER 4

WORK DETAILS

Section I. REQUIREMENTS AND PRACTICES (General)

The following operating requirements and safe practices are essential to most activities in which workers may be engaged and will be made a part of the operating requirements and safe practices covering specific operations. (See secs. II to XXXIV, incl.) These items will not be repeated for each work detail but will be presumed to be in effect for all jobs.

Operating Requirements (General)

1. *Appraisal of job.* The individual assigned supervision of a project, prior to beginning operation, will study carefully project requirements and prevailing conditions in order to estimate his particular work needs.
2. *Selection and assignments of men.* Judgment should be used in assigning work within the limits of capabilities. Qualified and experienced men will be assigned to make up at least the nucleus of the work party and to assist in training others.
3. *Congestion.* Work areas should permit freedom of operation. The presence of equipment, tools, materials, and personnel not immediately required will be avoided.
4. *Instruction.* No job will be attempted until the individual in charge is assured that each participant has received adequate instruction in the performance of his assignment, including instruction in all safe work practices and in the use of all special and personal protective equipment.
5. *Protection of personnel.* Personnel will be given the benefit of such protective clothing and equipment essential to the safe performance of an assigned task. Likewise consideration will be given to work controls under certain climatic conditions involving possible frostbite, sunstroke, or heat exhaustion, and to the adequacy of ventilation.
6. *Sanitary conveniences.* All places of employment will be provided with:
 - a. An adequate supply of fresh, pure and properly dispensed drinking water.
 - b. Adequate disposal of all waste.
 - c. Adequate facilities for maintaining personal cleanliness.

d. Adequate toilet facilities.

(See sec. II, ch. 3, for detailed requirements covering this subject.)

7. *Tools, equipment, and machines.* Sufficient properly designed tools and equipment, and provision for their maintenance, should be supplied for every job. Machine guards will be employed where mechanical hazards exist or are likely to be encountered. This generally includes the protection of all moving parts of machinery and transmission equipment, including gears, friction drives, belts, and line shafts; the removal of protruding set screws; the guarding of points of contact on machinery having cutting, punching, or sawing edges; the protection of crushing machinery and conveyors to prevent employees from falling into them; the complete covering of screw conveyors; the guarding of electrical fuse boxes and switching apparatus; the grounding of all electrical machines; and the placement of limit switches on cranes and hoists.

8. *Warning and protective devices.* Warning signs and protective devices will be employed to assure protection to workers as well as passers-by. This method generally includes the placing of informative signs; the use of color markings to point out physical hazards, the location of safety equipment, and to identify fire and other protective equipment; the placing of handrails, toeboards and nonslip floor surfaces on platforms, walkways, stairways, around engine flywheels, and wherever one may fall from an elevation. (See sec. I, ch. 3, for detailed requirements covering this subject.)

9. *Housekeeping.* High standards of housekeeping will be provided for and the maintenance thereof enforced. The following is a partial list of items to be considered:

a. Adequate lighting.

b. Clean and orderly machine, equipment, and working surfaces.

c. Ample and orderly tool storage.

d. Ample and orderly material storage.

e. Sufficient number of approved waste containers.

f. Systematic removal and disposal of waste.

g. Utilization of uniform color markings for physical hazards, protective equipment and devices, traffic lanes, and signs.

10. *Transportation.* In transporting personnel close attention will be given to safety instructions, disciplinary control, condition of equipment and mechanical safety devices.

11. *Accident reporting.* All personnel will be instructed to report promptly all injuries to person, no matter how trivial. Reports should be completed and processed as expeditiously as possible.

Safe Practices (General)

1. Report all injuries *promptly* so that proper first-aid or medical treatment can be given.
2. Be sure you understand the safe way to perform any task given you. Help new workmen to avoid unsafe practices. Report any instance of required instruction to your supervisor promptly.
3. Bring to the attention of your supervisor, at your first opportunity, any unsafe conditions you may observe.
4. Tools.
 - a. Inspect all tools, rope and similar equipment before using. Report broken or defective equipment immediately.
 - b. Use only tools that are in good condition. Burred or mushroomed heads on cold chisels, hammers, and other tools must be dressed before using. Replace splintered, broken, rough or loose tool handles before using tools. Keep cutting edges sharp.
 - c. Always use the proper tool for a job, for example, use hammers, pinch bars, and nail pullers for opening boxes; do not use a hammer or screw driver as a chisel.
 - d. Sharp edged tools should be stored in a safe place. Never carry unshielded tools in your pockets. Return all tools to supply room or tool kit.
 - e. There are specific safety rules for particular tools as well as the general safe practices listed above. Observe all of them.
5. *Wear safe clothing.* Do not wear thin soles on shoes, loose and ragged sleeves, unbuttoned coats, neckties, or over-size work pants. Keep shoe laces tied. Remove finger rings, wrist watches, and other jewelry before starting work on any kind of machine.
6. Never engage in horseplay or practical jokes.
7. Maintain *Good Housekeeping* at all times.
8. When handling material observe the following points:
 - a. Use gloves for rough or sharp objects.
 - b. Avoid pinching fingers between an object and a truck, wall, or other objects.
9. Lifting and carrying.
 - a. *General.* Lifting and carrying require care. Wrong methods cause unnecessary strains. Observe the following preliminaries before attempting to lift or carry.
 - (1) Size up the object to see if it can be safely lifted and carried.
 - (2) Ascertain whether nails, wire, or rough edges must be avoided in picking up and carrying the object, and whether gloves are necessary.
 - (3) Select the shortest safe route to travel with the object, avoiding holes, ruts, and slippery spots.

b. *Lifting.* To obtain the best results from your efforts practice the following rules:

- (1) Ask for help when, because of excessive weight, bulk, or awkward shape, the load cannot be handled easily by one person.
- (2) Remove greasy or other slippery substances from the hands. Get a good handhold.
- (3) Be sure you have good footing, then lift with a smooth, even motion.
- (4) When lifting a heavy object, shift the body until you are in a position to make a straight lift. Never lift while you are in an awkward position.
- (5) When making a lift from the floor keep your arms and back as straight as possible, bend your knees, and then lift with the leg muscles.
- (6) When it is necessary to lift objects from an elevation such as a bench, table, or shelf, bring the object as close to your body as possible to avoid unbalanced position. Keep the back as nearly vertical as possible and lift with the leg muscles.
- (7) In two-man lifts, lift simultaneously and avoid changes in levels which throw undue strain on one man.

c. *Carrying.* Safe carrying of materials requires adherence to the following rules:

- (1) Keep the load close to the body.
- (2) Avoid carrying heavy objects too great a distance without resting.
- (3) Do not pile material to be carried in such manner as to obstruct view.
- (4) When carrying a long object, such as a board or pipe, keep the front end high to avoid injuring others. Avoid collisions at blind corners.
- (5) In two-man carries, object should be on same respective shoulders, or arms, and normally the men should be in step. Avoid changes in level when possible.

10. Wear goggles approved for the particular job when grinding, snagging, chipping, welding, cutting, pouring, or handling hot metal or acid, and when doing any other work where flying material might injure your eyes. Use all protective equipment provided for you on special jobs.

11. Do not attempt to repair or adjust any electrical or mechanical equipment unless it is part of your regular work. Treat all electrical wires as live wires. Do not disconnect ground wires.

12. Do not talk to anyone while operating machines. Pay attention to your job.

13. Do not over-reach. Stretching to reach overhead objects may result in falls or strains. Use a ladder when you must climb. Do not reach around, over, or under a moving part of any machine.

14. *Ladders:*

- a. Do not use ladders with broken, splintered, or otherwise defective rungs or side rails.
 - b. Set ladder firmly on solid foundation before using. The foot of the ladder should be set one-fourth of the ladder length away from the support object. Lash ladder in place when footing or top support is not positive.
 - c. Have plenty of clearance at each side of, as well as in front of and behind, the ladder.
 - d. If the ladder stands in front of a doorway, lock the door and have someone guard it. Protect the ladder from traffic, if necessary.
 - e. Do not lean ladder against window sash; fasten a board to the ladder top as a bearing on each side of the window frame.
 - f. Face the ladder and hold side rails with both hands whenever climbing up or down. Do not try to carry tools or other equipment in hand.
 - g. Do not reach out too far in any direction from a ladder; climb down and move the ladder to the desired position.
 - h. When using a step ladder, be sure it is opened all the way before using it.
 - i. Do not leave tools on ladders.
15. Wash carefully with plenty of soap and water before eating and, if possible, before returning to quarters.
16. Increase the intake of water and salt to allay effects of exposure to excessive heat.

Section II. OFFICE

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Metal waste baskets with sharp edges or points will not be used.
13. Exposed sharp points on wire or expanded metal mail baskets will be repaired.
14. Spike files will not be used.
15. Broken glass desk tops should be discarded.
16. Loose veneer on desks and curved backs of swivel chairs will be repaired.
17. Sharp burrs on metal filing cabinet edges and perforations will be removed.

18. Metal lockers, files, and shelving should be secured to walls or floors.
19. Overloading of files, so that they may topple over if top drawers are pulled out all the way, will not be permitted.
20. Floors should be treated to prevent slipping and maintained in safe condition.
21. Loose linoleum or carpeting which creates tripping hazards will be made fast or repaired.
22. All room hardware, such as doorknobs, door stops, window catches, window locks, and transom operators, will be checked regularly for safety and security.
23. Pencil sharpeners will not protrude into aisles or passage-ways.
24. Protruding radiator valves, riser plugs, and steps to fire-line valves which present ankle and leg-pumping or tripping hazards, will be relocated or guarded.
25. Stacked newspapers or other ink printed matter will not be stored without sufficient ventilation.
26. Highly flammable materials will not be stored in lockers or in cloak rooms.
27. Adequate illumination will be provided.
28. Electric cords (for dictating machines, desk lamps, adding machines, and similar equipment) that have the insulation worn through or otherwise are damaged will not be used.
29. Protruding power and telephone outlets or conduit will be guarded by a permanent fixture or covered by a semipermanent fixture such as a desk.
30. Extension cords will not be placed on the floor across aisles or in other areas where employees have occasion to walk.
31. Moving parts on addressograph, mimeograph, bookkeeping, tabulating machines and other types of power-driven equipment should not be exposed.
32. Fans will not be placed on the floor or low shelves or any other place where they may be subject to accidental contact by persons. (Specially designed safety fans are excepted.)
33. Rolling and trolley type ladders for high filing should be provided with braking attachments.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Do not allow waste paper, discarded catalogs, magazines, or similar material to accumulate on floors as these may cause slipping and create fire hazards.

18. Do not stack material on top of lockers, filing cabinets, or in other high places from which it may fall.
19. Handle scissors and other office tools with care.
20. Do not place pins or clips in mouth.
21. Keep desk drawers and pencil trays free of loose razor blades, pins, and other sharp or pointed objects.
22. Do not leave thumb tacks on floor or in chairs.
23. Keep desk drawers free of "strike-anywhere" matches.
24. Do not place matches with heads exposed in stands.
25. Do not discard cigarette butts carelessly. Use ash trays or other suitable containers.
26. Do not carry sharp pointed pencils or uncapped fountain pens in belts, upright in pockets, or around the office in your hand.
27. Exercise caution when approaching transparent glass doors.
28. Exercise caution when rounding blind corners.
29. Walk through revolving doors, slowly, one person in a section.
30. Walk, don't run, in halls or on stairways.
31. Do not work directly underneath any fixture which is being repaired or replaced.
32. Do not tilt backward with the feet elevated in a swivel chair.
33. Close desk drawers by grasping handle and not edge of drawer.
34. Close drophead typewriter desks by using handle.
35. Close safe and vault doors by grasping handle and not the edge of the door.
36. When disposing of broken glass, wrap separately in paper, mark plainly, and place beside waste basket or trash container.
37. Use correct lifting methods.
38. When transferring file drawers, remove top drawers first so as to prevent file from becoming top-heavy.
39. Do not sit on open file drawers or waste baskets.
40. Do not leave open file or desk drawers unattended.

Section III. OUTSIDE GROUND CREWS

Operating Requirements

See sections I to XI, inclusive, chapter 4.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. The following good-housekeeping practices should be observed:

- a. See that no projecting nails, screws, splinters, sharp edges, pieces of metal or other materials that might cause injury have been left after completing a job.
- b. Collect all tools and return them to their proper places when through using them.

- c. Do not leave spilled grease or oil where it may become a slipping or fire hazard.
 - d. Be sure that rubbish, loose boards, and other materials are piled so that stumbling and tripping hazards are prevented. Do not pile materials near corners of buildings, open pits, trenches, walkways, or passageways.
18. Treat all electric wires as live wires; never pick up fallen wires or attempt to make splices until you *know* you are protected from electric current.
19. In the event a fellow-worker should come in contact with a live wire and is unable to free himself *Never* touch him with your bare hands in an attempt to render assistance. *Always* use a dry coat, rope, stick or some material that will serve as an electrical insulator.
20. When carrying ladders, pipe, and other long materials along carry the forward end up.
21. Do not jump into a trench; sit on the shoulder and slide in or, in deep trenches, use a ladder. When getting out of a trench near roadways, look in all directions to avoid injury by traffic.
22. Keep a safe distance from fellow-workers to avoid danger of striking them with or being struck by tools.
23. Keep shoulders of trenches and pits free from tools, materials, stones, and loose earth within a minimum distance of 2 feet from edge.
24. When using a hand shovel or spade observe the following precautions:
- a. Inspect the tool. See that it has a strong, smooth handle and grip, free from splinters, cracks, and splits; and that the blade is smooth, sharp, and free from twists.
 - b. Use the ball of the foot—not the instep—to press the tool into clay or other stiff material.
 - c. Avoid strains. Dig and lift loads by using the leg muscles as much as possible. Be sure of footing and balance when shoveling.
 - d. Never throw or toss a shovel or spade toward another person. Pass it with the handle forward.
 - e. Never leave a shovel or spade where others may stumble over it or strike against it. Hang it up, if possible; otherwise, stick the blade securely in the ground, or stand the tool in a corner.
25. When using a wheelbarrow, observe the following:
- a. Load properly, start in the bottom-center and keep an equal amount of load on both sides to avoid overturning. Stay as clear of handles as possible.

- b. Before wheeling a load, select the shortest safe route of travel to avoid holes, ruts, slippery runways, and other obstacles.
- c. When lifting the load, keep the back upright and lift with the legs.
- d. Do not run with a wheelbarrow at any time.

Personal Protective Equipment

- 1. Wear appropriate goggles when doing any work where flying material, or harmful light rays, might cause eye injury.
- 2. Wear safety shoes when handling heavy or rough materials or equipment.
- 3. Wear gloves on all rough work.

Section IV. BAKERY OPERATIONS

Operating Requirements

See sections I to XI, inclusive, chapter 4.

- 12. Sufficient sanitary supplies and equipment, as well as adequate storage facilities for all stock materials, should be provided.
- 13. A regular cleaning schedule should be in effect at all times.
- 14. Fresh and stale bread should not be stored together.
- 15. Smoking or chewing of tobacco or gum while handling food-stuff should be forbidden.
- 16. After finishing repair work on any equipment, all repair materials such as bolts, nuts, grease, wire, machine parts, or light bulbs should be collected and removed before the machine again is put into service.
- 17. Unsafe equipment such as defective pans, trays, plates, and similar equipment should be repaired or disposed of.
- 18. Be sure machines are in safe operating condition before being placed in use. Controls should be tagged or locked in the *off* position when being greased, oiled, cleaned, or otherwise serviced.
- 19. Provide metal container for ashes.
- 20. Where steam pressure is used in a baking operation, all steam hose connections should be clamped.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

- 17. Be extremely careful at all times to see that no dirt or foreign matter gets into the product at any point of manufacture.
- 18. When opening barrels use the proper tool to remove nails. It is advisable to remove the top hoop first, and then loosen the

- second hoop so that the head can be easily removed in one piece. This lessens the likelihood of splinters getting into contents.
19. After opening a container, make proper disposition of nails, splinters, metal bonds, bailing wire, and the like so that they will not get into foodstuff.
 20. Keep partly emptied barrels containing such materials as sugar, flour, and raisins covered to keep out foreign matter.
 21. Do not carry articles, such as pencils, combs, cigarettes or matches in shirt pockets, breast pockets of coat or jackets, caps or hats, behind ears, or any other place where they may fall into product.
 22. Dispose of milk and other beverage bottles promptly after use. Do not allow them to accumulate in corners, on floors, or window sills.
 23. Report to your superior any dough troughs having splintered wooden sides or lids.
 24. Do everything you can to keep storage rooms clean. Flour or starch mixed with the right amount of air can explode with great violence.
 25. If flour scrappings are burned, be sure that loose flour is not thrown upon a burning fire.
 26. Keep handles of lift trucks in upright position when not in use.
 27. Keep floors clean. Dry flour will cause floors to become highly polished; water will make them more slippery. Keep floor surfaces clean, nonslippery, and even.
 28. Keep particles of dough cleaned up from floors, stairways, and particularly around machine bases.
 29. Keep aisles and stairways clean and unobstructed. Do not leave brooms, pails, mops, cans of paint or polish, empty containers, or other articles where someone may fall over them.
 30. When stacking sacks or bags of material such as flour, sugar, or salt, see that stacks are properly located and cross-tied. If the height of the stack exceeds 5 feet, see that it is stepped back. Remove bags only from the top of the pile.
 31. The dough mixer is one of the most dangerous machines in the bakery. Make proper use of all safeguards and never put any part of your body in the machine when blades are in motion.
 32. Always stand to one side of a dough mixer when emptying it.
 33. Keep fingers clear of rolls when operating dough brake. Make use of guards.
 34. When cleaning rollers take great care not to get caught in the nip. Perform cleaning operations on the out-running side of the rolls.
 35. Always stop dough dividers before cleaning them.
 36. When dividing dough by hand be careful not to be cut by the dividing knife.

37. Report immediately any defective pans, trays, plates, or other equipment.
38. Do not operate rounders, proof machines, and slicers without all guards in place.
39. Use care when cleaning the knives or blades on biscuit cutters and dividers. Be sure you have received proper instructions before doing this work.
40. When ovens are fired with gas or oil, there is always the possibility of an explosion. Report immediately any valves that appear to be leaking. Do not look for a gas leak with an open flame.
41. Before lighting an oven check the following:
 - a. If oven is cold, see that it is thoroughly ventilated to remove any accumulation of gas.
 - b. Be sure pilot lights show a strong, blue flame before turning on any of the main valves.
 - c. See that all flues are open.
 - d. Make certain that manufacturer's instructions are rigidly followed.
42. Report any peels that have splintered or cracked handles or otherwise are not in proper repair. Be careful when passing an oven man handling a peel.
43. Do not use space at the top and sides of ovens for storage. Keep peels in racks provided.
44. Do not work around ovens unless properly instructed.
45. Do not put hands or arms into baking chamber.
46. Extinguish flame before removing grease kettle from gas burner.
47. Use a long handled ladle to dig grease from kettles.

Personal Protective Equipment

1. Wear suitable gloves or hand pads to avoid burns when operating ovens.
2. Wear goggles and high shoes or canvas spats for protection against splashing grease when operating doughnut kettle.
3. Wear suitable gloves or canvas hand pad when cooking frostings and fillings for pastries.

Section V. MESS HALLS

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Separate storage lockers for cleaning materials such as soap, metal cleaner, and lye should be under or near sink. All such items should be stored in locker when not in use. Lye and other harmful materials should be properly labeled at all times.

13. Ventilation should be adequate. All exhaust ducts, hoods, and motors should be cleaned thoroughly each week.
14. Tables, benches, and center-boards should be free of splinters and protruding nails.
15. Dishes and glassware should be free of cracks and chips.
16. Refrigeration should be provided for cream pastries, hollandaise sauce, gravies, tenderized hams, and similar foods to protect from food poisoning.
17. Individuals having an infected cut, boil, or open sore on hands or face should not be permitted to handle food.
18. Individuals having a cold or sore throat should not be permitted to handle food.

Tool and Equipment

19. Knives, cleavers, icepicks, and cooking forks should be kept sharpened, have good handles, and be kept in safe storage when not in use.
20. Electrically-operated meat grinders, saws, mixers, slicers, ice chippers, and pressure cookers should be guarded and grounded in accordance with the National Electrical Safety Code.
21. Boilers should be inspected regularly and maintained in safe working condition. Hot water pipes and steam lines should be insulated or protected wherever their locations will expose persons to burns.
22. Hangers should be provided for pokers and other stove tools.
23. Large food containers should have substantial handles.
24. An adequate supply of safe vegetable parers should be available.

Storeroom

25. Shelving should be strong and well designed, in good repair, and free of splinters and loose nails.
26. Materials should be piled safely. Heavy materials should be stored on lower shelves.
27. Ladders should be provided for shelves more than 6 feet from floor.
28. Harmful materials such as insecticides, cleaning materials, poisons or other contaminants should not be stored in food storeroom.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

Proper precautions should be taken at all times to prevent dirt or foreign matter from getting into foods. Good housekeeping will make this easier and help prevent accidents.

17. When opening barrels, use the proper tools to remove nails. It is advisable to remove the top hoop first and then loosen the second

hoop so that the lid can be removed in one piece. This prevents splinters getting into the contents.

18. Keep partly emptied barrels, bags, and other containers of food covered. All containers should be marked properly as to contents.

19. When opening canned goods report to your supervisor, before opening, all cans which are bulged at the ends or show signs of leakage.

20. Keep all screens and display cases closed to protect food from flies, other insects, and rodents.

21. Do not carry articles such as pencils, combs, or matches in shirt pockets, breast pockets of coats or jackets, caps or hats, or behind ears as they may fall into food.

22. Use pads of suitable pieces of cloth when handling hot utensils. Get help on large containers. Move smoothly and lift properly.

23. Turn handles of cooking utensils parallel to the front of the range and do not allow them to protrude into the aisles.

24. Before removing a container of hot substance from the range decide where you are going to put it, and be sure that no one is passing.

25. Use a broom and pan to pick up broken china and glass. Dispose of pieces immediately in container provided. Wipe up spilled foods immediately.

26. Follow manufacturer's instructions in the use of disinfectants, cleaning powders, and fluids. Quantity should be measured, not estimated.

27. Keep floors clean and dry. Avoid mopping or scrubbing floor areas that are in use. Limit cleaning to a small area and then mop this area dry before proceeding. Do not wet the entire floor at one time.

28. Use extreme care when handling steam hose. Be sure the nozzle and all connections are secure before turning steam into hose.

29. Do not ride on or run with mess carts.

30. Do not leave mess carts, or other types of food conveyors, unattended in aisles, corridors, passageways, or any other place where they may become a tripping or collision hazard, or an obstruction to normal work. Block carts before leaving unattended on sloping surfaces.

31. Exercise care when approaching doorways, hallways, corridors, and on entering elevators, with mess carts.

Personal Protective Equipment

Use pot holders, gloves (rubber, cloth, and asbestos), goggles, and aprons (rubber and cloth) as needed.

Section VI. FOOD PROCESSING AND DEHYDRATING

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Floors adjacent to wet processes should be waterproofed to facilitate cleaning. Nonslip surfaces are desirable. Drainage should be provided and duckwalks employed where necessary.

13. Ample ventilation should be provided for hot processes such as cooking rooms.

14. Use and maintenance of pressure apparatus must be closely controlled. Instructions of manufacturers should be followed.

15. Wooden top tables, duckboards, and wooden floors should be inspected frequently and kept in good condition.

16. Individuals having an infected cut, boil, or open sore on hands or face should not be permitted to handle food.

17. Individuals having a cold or sore throat should not be permitted to handle food.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Use walkways when crossing conveyors.

18. Before turning steam or hot water into a hose, make certain that all connections are secure and the end of the hose is held firmly.

19. Check steam hose fittings frequently to assure proper maintenance.

20. Relieve pressure before opening retorts.

21. Mop or wipe up spillage immediately.

Personal Protective Equipment

1. Use pot holders, hand pads, gloves (rubber, cloth, or asbestos), goggles, and aprons (rubber or cloth) as necessary.

2. Wear safety shoes on container handling and packing operations.

3. Wear wooden-soled or rubber shoes as advisable.

Section VII. LAUNDRY AND DRY CLEANING OPERATIONS

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Only authorized persons will be permitted to operate or make adjustments on laundry or dry-cleaning equipment, or handle cleaning solvents.

13. Broken or badly worn machine belts will be replaced immediately.

14. Push-trucks, skids, or clothes boxes and duckboards that are badly worn or splintered will be repaired or replaced promptly.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

Receiving Room

17. Dump laundry out of bags. Do not place hands inside bags to pull out laundry as you may be injured by broken glass, buttons, or other sharp objects accidentally placed in bags.

18. Feel the pockets of garments for any objects that may be left in them and remove them carefully.

19. Take no chances with cuts or scratches from wire, pins, glass, or buttons. Get first-aid immediately.

20. Do not indulge in horseplay with the air hose.

Machinery

21. When excess vibration of extractor is noted, stop machine at once and balance loads in extractor basket. Start extractors or "whizzers" only after the cover is in proper position over the revolving drum. Load or unload these machines only after they have come to a complete stop.

22. Do not try to stop a "whizzer" too suddenly by extremely heavy use of the brake. Never attempt to stop the drum with your hand.

23. Report immediately all defective interlocks on washing barrels and extractors.

24. Make proper use of all safety devices on washers, extractors, and dry tumblers and check daily to see that all guards are in place. If safety interlocking devices are not in proper working order the machine should not be operated.

25. Do not wear loose clothing, long sleeves, loose gloves, or have long hair unconfined in the vicinity of moving machinery.

Ironing and Pressing

26. Pay strict attention to your work while feeding a flat work ironer, as one moment's inattention may cost you your hand.

27. Each day before starting a flat work ironer, test the barrier guard in front of the feed rolls by tripping it so that you know it will stop the action. Do not operate the ironer when the guard is out of order or off the machine.

28. Do not try to remove a piece which has started through the rolls unevenly.

29. Place your hand iron in its own rack or stand when not in use.

30. Report frayed, twisted, or worn electric iron cords and burned out pilot lights to your supervisor.

31. Do not place your hands directly on the shirt, or on the lower board, immediately after shirt pressers have been opened.
32. Talk to no one while operating machines. Pay strict attention to your job.

Drying Room

33. Keep hangers, pins, and unnecessary materials off the floors.
34. Avoid over-loading clothes racks or push trucks.

Dry Cleaning Operations

35. Do not smoke or carry matches or lighters in the dry-cleaning department.
36. Inspect all garments carefully to make sure that pins, knives, or other metallic articles are not left in the pockets.
37. Be particularly careful when inspecting garments so as not to be cut by anything left in the pockets.
38. Avoid slopping cleaning solutions on the floor.
39. Keep dry-cleaning machines closed except when garments are being put in or taken out.
40. Do not rinse garments (especially silk) in an open vessel.
41. Drag garments across the edge of the cylinder when removing from cleaning drum to provide a ground for static electricity.
42. Do not operate or make any adjustments on the solvent still unless authorized.
43. Do not use cleaning solutions for washing the hands or other portions of the body.

Maintenance

44. Clear all floor drains that are clogged. Keep drain cover plates fastened in place.
45. Replace vapor-proof or double-glass globes when they have been removed for any reason. Do not use substitutes.
46. Use a belt shifter or pole to shift a belt; never use your hand as the lacing may cut or drag you into the pulleys.
47. Keep grease and oil from accumulating on floors.
48. All machines and safety devices should be checked regularly for defects and necessary repairs made promptly.
49. When washing floor keep the wet area as small as possible. Mop up immediately after washing.

Personal Protection Equipment

1. Wear goggles when using an air hose for blowing dirt from pockets or trouser cuffs.
2. Wear respirators and goggles when cleaning solvent filters.
3. Wear goggles when handling stain removing chemicals, caustic soda, or other materials used in the clarification system.
4. Wear rubber or synthetic rubber gloves when hands are con-

stantly exposed to solvents. Protective hand creams should be available for use in limited exposure.

Section VIII. WAREHOUSES

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Runway sections should be used to bridge the space between the railroad car door and platform. These sections should be bolted or cleated to prevent them from shifting or falling.

13. Materials should not be placed in such position that clearance between docks, buildings, ramps, or platforms and railroad track-age adjacent thereto may be obstructed.

14. Where pallets are not used, extra care should be required to stack material carefully; i.e., tiers should be aligned and dunnage used, where necessary, to insure a balanced stack.

15. Dunnage should not be placed in such manner that it does not extend beyond the sides or ends of stacks.

16. Bagged goods should be stacked by employing the "key-bag" method of stacking, cross typing correctly. Stacks generally should be as high as the floor load and nature of the commodity permit. Stacks of commodities that creep should be inspected frequently for stability.

17. Conveyors, stackers, lifts, and similar mechanical equipment should be available for material handling and moving operations.

18. Only those persons who have proved their ability and who possess valid drivers' certificates, as issued by proper authority, should be allowed to operate any fork-lift truck or other type of power-driven mobile material handling equipment.

19. Where mobile equipment is used:

- a. Aisles or truck runways should be well defined.
- b. Aisles should be kept clear of overhanging or projecting obstructions.
- c. Care should be exercised by operators of power-driven equipment at blind corners where there may be heavy traffic.
- d. All floors and pavements should be kept in good repair.
- e. Fork-lift trucks should be equipped with a fork carriage guard attached to the elevating device to prevent containers or other load from falling on the machine or its operator. Certain operations may require the use of an over-head guard as added protection.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Do not attempt to lift heavy or cumbersome objects without sufficient help.

18. Do not attempt to move or lift extremely heavy objects without the aid of rollers, hoisting tackle, or mechanical equipment.
19. When rollers are used, keep hands and feet clear.
20. Avoid standing under a suspended load or in the path of a swinging load.
21. Block or nest to prevent rolling all cylindrical objects stored in a horizontal position.
22. Keep platform clear of obstructions such as tools, trucks, or material.
23. When placing cases on pallets for stacking, place them squarely and carefully. Design pallet patterns for safe stacking.
24. Avoid taking down a stack in such a way that trucks, pallets, or section posts block avenues of escape if stack should slide.
25. Load hand trucks so you can see over and around the load. Watch where you are going when pushing or pulling a hand truck. It is usually best to push a hand truck. Keep the load in balance to avoid objects sliding or falling off. Consider door and aisle widths in loading.
26. Park hand trucks with handles in vertical position and in a location that fellow workers will not stumble over them.
27. Remove all protruding nails from boxes, barrels, and cases before unpacking supplies.
28. Do not throw scrap lumber on floor where it may create a tripping hazard.
29. Keep flammable packing materials in closed bins provided for this purpose, except for quantities in immediate use.
30. Keep aisles and exits clear at all times. Do not block or otherwise make fire doors inoperative. (See TM 38-402, when published.)
31. Get help when going *up* or *down* a ramp with a heavy load.
32. Keep well clear of the edge of the ramp.
33. Boxcar doors should be pushed open instead of pulled open. When opening and closing a boxcar door, be sure that the door is held securely to hanger or rails. First open the door slightly to make sure nothing is going to fall out. Keep fingers in the clear when closing door.
34. Check contents of railroad cars for unsafe position of loads before starting to unload.
35. When operating fork-lift equipment, observe the following:
 - a. Do not carry passengers.
 - b. Load carefully. One pallet at a time generally is a sufficient load.
 - c. Keep base of top units of load well below framework of carriage guard and *do not overload*.

- d.* Before raising load make sure there are no obstructions such as sprinkler lines, heating units, electrical fixtures, or cross beams.
- e.* Lift the load slightly backward to prevent dropping cases. Always carry the load against the boom.
- f.* Lower the load to within 4 inches of the floor before starting. Always lower smoothly, without jerks.
- g.* When moving, watch the way carefully, take corners slowly, and sound horn or other warning device at all corners and cross aisles. Use hand signals to indicate change of direction or a stop.
- h.* Travel in reverse when loaded except when ascending an incline.
- i.* When placing a loaded pallet on a high stack, exercise caution when tilting the boom forward.
- j.* Be sure the emergency brake is set, the gears disengaged, and the forks lowered flat against the floor when you park.
- k.* Do not leave controls while motor is running.

Personal Protective Equipment

- 1. Wear safety shoes.
- 2. Wear gloves or hand pads when handling rough matter.

Section IX. SHOE AND CLOTHING REPAIR

Operating Requirements

See sections I to XI, inclusive, chapter 4.

- 12. Local exhaust equipment should be employed wherever any concentrated dust is generated in the handling or processing of leather, hair, fur, or similar materials. General ventilating systems should be provided where contamination is not fully controlled by local or unit exhaust equipment.
- 13. Explosion hazards should be reduced by humidifying the air. Accumulations of finely divided materials on overhead structures and in other places should be removed periodically.
- 14. Sufficient light should be supplied to all areas where close work is required. All working areas should be checked periodically, preferably with a light meter, to see that the intensity of light is adequate for the work being done.
- 15. Personnel should report for first aid for all pin, needle, and other puncture wounds, cuts, and other injuries, even though considered of a minor nature.
- 16. Employees should be properly trained in the use of electric irons, pressing machines, and steam blocking devices, in order to prevent burns and scalds.
- 17. All exposed steam pipes should be covered, to prevent burns.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Avoid the accumulation of cutting and scraps. Place them in containers provided.
18. Keep nails, pins, and needles in suitable containers. Do not place in your mouth.
19. Use correct size needle for the type of material when sewing by machine or hand.
20. When operating sewing machines or other equipment, keep hands a safe distance from point of operation. Do not remove needle guard.
21. Cut threads with scissors or knife in preference to severing with teeth or tearing by hand.
22. Keep knives, awls, scissors, and other sharp tools sheathed or on tool board when not in use.
23. Use care in emptying pockets of clothing prior to repair or alteration.
24. In cutting materials, always cut away from the holding hand.

Personal Protective Equipment

1. Wear respirators if warranted by concentrations of dust.
2. Wear finger or hand protection, as necessary.

Section X. MASONRY

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Scaffolds or supports should be erected according to accepted standards, and equipped with railings and toe-boards.
13. Wind bracing should always be provided.
14. Scaffold horses should be solidly constructed and substantially placed; they should not rest on piles of brick or tile.
15. Provide tackle, stone-tongs, grab-hooks, and derricks with sufficient capacity for the job.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Inspect scaffolds before using; report any defects.
18. Where suspended scaffolding is to be used, examine the cables, machines, and ratchets for possible defects.
19. Avoid overloading scaffolds and floors. Do not concentrate loads.
20. Keep materials back from outside edges of open floors and from all floor openings.

21. When working near exposed openings or edges of floors, be careful not to drop bricks, pieces of brick, stones, or other material.
22. Place tools on scaffolds where no one will fall over them and where they cannot be knocked off.
23. Where stone is lifted by derrick, make sure that the load is handled so as not to injure persons or damage scaffolds.
24. Make sure that all stone is properly secured to prevent slipping.
25. Always use a sufficient number of permanent anchors so that stone cannot loosen either during construction or afterward.

Personal Protective Equipment

1. Wear suitable goggles when cutting stone, tile, or brick.
2. Wear safety shoes.
3. Wear suitable coverings to protect skin abrasions.

Section XI. PLUMBING

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. All combustible materials in the immediate vicinity of blow torches or furnaces which are in use should be protected, or should be at a sufficient distance to prevent their being subjected to dangerously high temperatures.
13. Every gasoline blow torch and plumber's furnace should be provided with a complete set of operating instructions, i. e., directions for filing, pumping air pressure, lighting, and extinguishing.
14. When blow torches or plumbers' furnaces are operated in confined spaces, adequate ventilation should be provided to protect against possible lack of oxygen or presence of poisonous gases.
15. When melting materials such as lead and zinc, which may give off toxic fumes, make certain that proper exhaust or ventilation for such fumes is provided.
16. All trenches over 3 feet 6 inches in depth should be shored, except in stiff clay or rock.
17. Where trenches are 5 feet or more, there should be men on top to keep the edges clear. No material should be piled nearer than 18 inches from edge of trench.
18. Be certain that staging used in handling dirt in deep trenches is constructed of sound material and well braced.
19. Two men should be assigned to each sewer job where the hazard of broken or leaking pipes may be present, one of whom always should be in a relatively safe position and prepared to render assistance in an emergency.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Caulk small leaks, tune up pipes, tighten nuts, and make other adjustments or repairs to tanks, boilers, and other vessels only while pressure is off.

Gasoline blow torches and plumbers' furnaces

18. Avoid pointing torches toward a passageway in such manner as to endanger a passerby. Extinguish flame unless the torch is going to be used again shortly. Do not leave torches or plumbers' furnaces burning unattended. Be sure that flame or heat of torch is never deflected back on itself.

19. Keep at a safe distance from burning torches or furnaces if clothing is greasy. If gasoline or similar flammables have spilled on clothing, *immediately* leave the working area, change the clothing, and do not wear it again until it has been washed.

20. Gasoline blowtorches and plumbers' furnaces preferably should be filled out-of-doors. If they are filled indoors, it should be at a well ventilated location remote from open flame, sparks, or other sources of ignition. Do not loosen the filler plug, or fill while the burner is hot.

21. Do not use gasoline containing lead compounds or benzol in torches or furnaces.

22. Laundry soap may be used on threads of the filler plug to insure a tight seal. Tighten the filler plug gently; force may ruin the gasket or strip the threads of the plug.

23. Do not alter torches or furnaces to permit pumping up the pressure by any method other than the use of pumping device provided by the torch manufacturers.

24. Do not pump up pressure excessively at any time. Five to fifteen strokes of the pump are enough, depending upon the size of the tank and the amount of gasoline in it.

25. Release pressure and secure the valves before storing torches or furnaces.

26. Avoid over-filling the priming cup. Should gasoline flow over the tank, wipe it off before the torch or furnace is lighted.

27. Examine torches or furnaces for leaks before lighting.

28. Light torches or furnaces only after nearly all the gasoline in the priming cup has been consumed.

29. Immediately after lighting the torch or furnace, shield the flame from the wind. Windbreaks should be made of noncombustible material, should not extend under torch or furnace, and should be easily removable.

30. Keep stuffing boxes tight to prevent leaks around valve stem.

31. Tighten stuffing boxes only while torches or furnaces are not being used.
32. Do not drag torches across the floor, drop, or otherwise abuse them.
33. Use care in heating pots to prevent overflow or ignition of the material contained therein.

Trenching

34. Avoid working too close to other workers; 12-foot minimum spacing is recommended.
35. Keep a clear space at least 18 inches wide along the edges of trench to prevent rocks, tools, and other material from falling on persons in trench.
36. Keep tools, rock, and other material on out slope of excavated material, or on opposite side of trench from the excavated material, where surface is flat.
37. On hard surface roads where traffic is maintained, keep pebbles and small stones swept into the excavated material to prevent their being thrown by passing vehicles to injure persons or property.

Personal Protective Equipment

1. Wear flame-proof garments when using blowtorches, welding torches, or other similar tools.
2. Before starting work on sewer jobs where the hazard of broken or leaking pipes may be present, check availability of the following equipment and use as necessary:
 - a. Gas detectors.
 - b. Respirators.
 - c. Inhalators.
 - d. Standard gas masks.
 - e. Safety belts.
3. Wear goggles when pouring or handling hot metal or acid, and when doing any other work where flying material might injure the eyes.

Section XII. ELECTRICAL WORK

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Electrical machines, equipment, wiring for temporary or permanent use, fixtures, and all other electric current carrying devices or installations will be installed, maintained, and serviced by competent and qualified workmen only.
13. All current carrying parts of electrical supply lines, stations, or other installations exposed to possible contact, will be so ar-

ranged as to provide adequate clearance, or will be provided with guards to isolate them effectively.

14. Each temporary service will terminate in a service switch of the safety type located in a readily and safely accessible place. In addition, when temporary wiring is used in tanks, sewers, cofferdams, or other confined spaces, an approved type switch will be provided at the entrance to such spaces.

15. Temporary wiring will be strung so that it will not cross other power lines, telegraph or telephone wires, fences, or radio antenna.

16. All circuits will be equipped with fuses of proper size, or have circuit breakers adjusted for the designated safe load.

17. The use of slugs or jumpers on circuit breaking devices will be prohibited.

18. Overloading of electric circuits will be prohibited.

19. Adequate and readily accessible working space, with secure footing, will be maintained about all electric parts or equipment which require adjustment or examination while in service.

20. Suitable insulating mats or platforms will be so placed on floors, and, if necessary, on frames of machines having exposed live parts of more than 150 volts to ground, that the operator or persons in the vicinity cannot readily touch such parts unless standing on the mats, platforms, or insulating floors.

21. Adequate illumination will be provided in rooms and spaces where electrical apparatus or machinery is located.

22. The frames and other metallic noncurrent carrying parts of all portable devices operating at over 60 volts to ground will be grounded.

23. The frames of generator motors, switch boards, cases of transformers, lightning arresters, and other electric equipment operating at more than 150 volts to ground, will be permanently grounded.

24. No work will be done on any wiring or equipment, carrying 600 volts or over when operative, until the section or part to be worked upon is protected on both sides by grounds, blocks, by-passes, hold-off systems, or other effective means.

25. When working poles, two men will work together, one man on the pole, and the other on the ground near the foot of the pole. No man will be permitted to remain on the pole whether working or waiting unless the attendant is in position at the pole base.

26. Rooms and enclosures containing storage batteries will be so ventilated as to remove acid spray and prevent accumulation of flammable gas.

27. Switches and incandescent lamps in battery rooms will be of the vapor proof type.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Take precaution to cut off current and lock switches before making alterations or repairs to electric equipment.

18. When working around dead electric apparatus, observe the same precautions used when parts are live.

19. When working on lines which are supposedly dead, ground the lines by using proper grounding equipment at each of the adjacent line poles.

20. Inspect safety belts, climbers, gaffs, spurs, and other equipment regularly.

21. When climbing poles which have not been barked or skinned, use climbers equipped with extra long spurs. In no case use climbers with worn or blunted spurs.

22. In working on electrical equipment where live parts are not inclosed, it is advisable to use only one hand, because completing a circuit from one hand to the other is more dangerous than from finger to finger on the same hand.

23. Wear suitable clothing when working on or about live electric equipment. Keep sleeves down and avoid wearing conductors such as metal or celluloid watch chains, buttons, visors, or the like.

24. Never leave ground wires leading from electric apparatus disconnected or broken.

25. Do not tap live wires except when absolutely necessary. If wires are insulated, remove the insulation from only one wire at a time. Do not expose the second wire until the first tap is made and the joint insulated.

26. When working on hot or live lines, take care to stand on dry, nonconductive surfaces such as wood planks or insulated platforms.

27. Take particular care to repair all defective, frayed, or broken insulation immediately.

Personal Protective Equipment

1. Use gloves, sleeves, boots, and blanket shields made of high grade rubber, insulating mats and platforms, impregnated wooden rods, fiber tongs, and insulated tools, as required, when exposure to live electrical parts becomes necessary.

2. All rubber protective equipment should receive annual dielectric tests, except rubber gloves which should be tested at 60-day intervals.

3. Inspect all personal protective equipment each time before use and when found defective remove from service until repaired or replaced.

Section XIII. CARPENTRY

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Scaffolds or supports should be erected according to accepted standards.
13. Provision should be made for the frequent removal of sawdust, chips, and shavings from machinery and surrounding area.
14. Standard metal containers should be provided for oily rags and other flammable material storage.
15. Each power tool should be provided with an individual control switch or belt shifter easily accessible to the operator.
16. Band saws should not be operated at a temperature below 45 degrees.
17. Point of operation guards should be provided on all wood working machinery. (See sec. III, ch. 3.)

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Do not leave nails, or pieces of wood with protruding nails, on the floors; pick them up.
18. Operate power tools only when authorized.
19. Do not start power tools and work until all are properly adjusted and all safety devices are in place. Do not remove or alter safety devices.
20. Do not permit power tools to run unattended.
21. Stop power tools if you must talk to anyone, for instance, if listening to instructions.
22. Avoid standing in direct line with rapidly revolving machine parts or with materials being fed to or delivered from machine.
23. Do not let anybody operate the control button or lever of your machine while you are working on it, and do not touch those of a machine on which someone else is working.
24. Use special care in machining pieces less than 12 inches in length.
25. Walk around rather than reach over a machine, for any purpose.
26. Keep hands out of line of travel of a saw. Place hands to the side and to the rear of the material being sawed.
27. Adjust saw table so that saw does not protrude more than $\frac{1}{4}$ inch above material being sawed.
28. Calibrate work only while machine is not running.
29. Stop power tools when work or machine is being cleaned or adjusted. Use a brush or stick to remove shavings or drillings.

30. Use machines only for the type of work for which they are intended.
31. Before using an extension cord make sure there are no breaks in the insulation and that plug and socket are in good condition. (See TM 5-226 for additional operating information under this heading.)

Personal Protective Equipment

1. Wear goggles when doing work where flying material might injure eyes.
2. Wear kick-back apron when operating circular cross cut saw.
3. Wear safety shoes.

Section XIV. PAINTING

Operating Requirements

See sections I to XI, inclusive, chapter 4.

General

12. Exhaust ventilators should be provided for all spray painting enclosures.
13. Personnel not actually engaged in painting or assisting should not be allowed in the spray paint rooms.
14. Only explosion-proof electrical equipment should be used in spray booths.

Prevention of fires

15. An adequate supply of fire control equipment should be provided for all painting operations.
16. Packages containing paints, varnishes, lacquers, thinners, or other volatile painting materials should be kept tightly closed when not in actual use, and should be stored in well-ventilated places where they will not be exposed to excessive heat, smoke, sparks, flames, or direct rays of the sun.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

General

17. Hang the paint bucket from a ladder by a suitable "S" hook; hold to the ladder with one hand while painting.
18. When working from a scaffold, make sure that it is substantially built and well braced.
19. Do not impair the effectiveness of respirators by altering in such a manner that air will pass around the mask instead of

through the filter. Change filters frequently to maintain necessary absorption quality.

20. Report immediately any deficiency in exhaust mechanism of cleaning booths.

21. Do not block exits.

22. Adjust the gun pressure so that it does not produce excessive mist.

23. Do not use compressed air for cleaning booths.

Helps in avoiding lead poisoning

24. a. Eat a good breakfast; drink plenty of milk with meals and between meals.

b. Do not eat, drink, or store food in any room which is being painted.

c. Avoid touching the face or lips with fingers while at work.

d. Before drinking or eating, clean the lips and rinse out the mouth. Wash the hands, arms, and face with soap and warm water before eating, before going to the toilet, and before going home.

e. Wear suitable clothing, preferably cap, overalls, and jumper. Wash yourself thoroughly and change clothes *before* going home. Have working garments laundered frequently.

f. Keep the teeth clean, fingernails short and clean; and hair and beard short.

g. Take a bath with soap and warm water at least twice a week; scrub the hair also.

h. Keep the bowels moving regularly—at least once a day.

Prevention of fires

25. When gasoline torches are used to remove old coats of paint, use care against any possible fire hazard.

26. Do not smoke in, or carry matches into, the paint room.

27. Do not remove fire fighting equipment without specific permission from your foreman or for actual fire fighting or servicing of equipment.

28. Avoid flames and sparks of all sorts when applying a coating material that contains flammable solvents.

29. Keep all unnecessary objects and materials picked up and out of the way.

30. Place all sweepings, waste, and oil or paint saturated rags in covered metal containers; wet down, and keep the lids of the containers closed.

31. Do not use flammable solvents to clean the walls of spray booths.

32. Use only nonsparking tools.

Personal Protective Equipment

1. Wear approved respirators on paint burning operations.
2. Wear approved respirators at all times during spray painting operations.
3. Wear safety belts properly secured when working on steep roofs, high elevators, or other similarly dangerous locations.
4. Wear gloves when removing broken glass from window sash.

Section XV. LUMBER YARDS

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Box car rollers (device used to support the long pieces of lumber in the door entrance) will be well constructed and designed so that there is little possibility of the roller breaking. Rollers will be firmly anchored so that they will not be dislodged.

Spotting cars

13. Side track switches leading to the lumber yard will be protected with padlocks.

14. Standard railroad signs or signals (blue metal flags during the day and blue lights at night) will be used to warn railroad workers that a car has been spotted on the lumber yard siding and unloading operations are to begin or are in process. The wheels of all single spotted cars should be chocked and the brakes set. The end cars of a string of cars should be similarly treated.

15. When avoidable, cars should not be spotted on a grade. When this is necessary, it is especially important that wheels be securely chocked, the brakes set, and both frequently inspected.

Lumber piling

16. Lumber will be stacked on a firm substantial base which will prevent shifting or sinking, and high enough off the ground to allow for ventilation.

17. Maximum height of lumber stack should be 16 feet. Toppling due to wind pressure and settling makes higher stacks hazardous. Height of stack is dependent upon size of base, i.e., the base width should be not less than one-third height. Sufficient dunnage should be used to insure stability.

18. Top layer boards should be placed close together to protect the stack from the elements. Fasten roof securely in place to prevent loose boards from blowing from the stack.

19. Fire breaks approximately 25 feet wide should be left between rows of stacks.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

Personal Protective Equipment

1. Wear safety shoes and hand leathers or gloves.
2. Wear leather aprons and hard hats as advisable.

Section XVI. FUEL WOOD HANDLING YARDS

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. When practical, trucks should be loaded direct from cars.
13. Small conveyances should be loaded directly inside box cars and moved to the outside area by means of ramps or bridges.
14. Sidetrack switches leading into the wood yard shall be protected with padlocks.
15. Standard railroad signs or signals (blue metal flags during the day and blue lights at night) should be used to warn railroad workers that a car has been spotted on the wood yard siding and loading operations are to begin or are in process. The wheels of all single spotted cars should be chocked and the brakes set. The end cars of a string of cars should be similarly treated.
16. When avoidable, cars should not be spotted on grade. When this is necessary, it is especially important that wheels be securely chocked, the brakes set, and both frequently inspected.
17. Fuel wood should be stored in cord wood fashion.
18. The height of fuel wood storage should not exceed 6 feet.
19. Proper aisles should be maintained between fuel wood storage piles.
20. The storage area should be kept in a neat, orderly manner with all combustible debris removed.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Avoid working too close to other men, particularly when pitching wood from car onto truck.
18. Keep clear of trucks. Do not ride on the sides or on the load.
19. Do not undercut wood pile in removing wood from storage.
20. Use grabhooks of suitable length to pull down piles in cars or piles on the ground after unloading.
21. Where wheelbarrows, hand trucks, or similar vehicles are used, avoid over or improper loading, and avoid excessive weight on handles.
22. In loading trucks from storage pile, work from one side of truck only.

Personal Protective Equipment

1. Wear safety shoes.
2. Wear gloves.

Section XVII. COAL HANDLING YARDS

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Trestles will be provided with safety footwalks on both sides. These footwalks will be protected by standard hand rails and toeboards.

13. Trestle crosswalks will be provided.

14. Openings between trestle rails will be guarded by a grating or chain guard.

15. Wherever possible, barricades should be used to prevent entry into areas under or near the trestle.

16. When a trimmer enters the gondola car, it is essential that the bucket be moved only when the trimmer is at the farthest possible point from the bucket. If at all feasible, trimmers should be kept out of the gondola car when the grab bucket is in operation. In addition to the operator of the grab bucket, a control man should be provided to position the bucket in the loading and unloading operations. The control man should be charged with the responsibility of keeping other men from underneath and at a safe distance from the grab bucket at all times.

17. The hopper opening wrench should be so designed that the operator will not be injured by pinching parts of his body between the wrench and the car, and that the wrench will be released when the hopper door shaft starts to revolve.

18. All portable conveyors will have gears, chains, sprockets, and other moving parts completely guarded. Where an electric motor is used as the motivating force, the motor should be completely inclosed, properly grounded, and approved electric conduit used to connect the motor to the power supply. Transmission shafts will be properly guarded.

19. Where a combustion engine is used as the motivating force, all transmission lines, gears, shafts, and other moving parts will be completely guarded.

20. Coal should be stored in a manner which will prevent fires by spontaneous ignition.

21. In the event that stored coal begins to burn or smolder, men working nearby should leave the immediate vicinity until combustion is halted.

22. Track switches leading to the coal yards will be protected with padlocks.

23. Standard railroad signs or signals (blue metal flags during the day and blue lights at night) will be used to warn railroad workers that a car has been spotted on the coal yard siding and unloading operations are to begin or are in process. The wheels

of all single spotted cars should be chocked and the brakes set. The end cars of a string of cars should be similarly treated.

24. When avoidable, cars should not be spotted on a grade. When this is necessary, it is especially important that wheels be securely chocked, the brakes set, and both frequently inspected.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

Personal Protective Equipment

1. Wear safety shoes.
2. Wear hard hats when working near grab buckets or near trestles.
3. Wear goggles in unloading cars and when working on or near conveyors.
4. Wear life belt when entering hopper cars (hoppers open). Belt should be connected by means of a life line to a substantial support. Have a second man stand by at all times with an auxiliary life line connected to the life belt to assist the worker in the car when necessary.

Section XVIII. RAILROAD TRACK MAINTENANCE

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Excavations on or about tracks should be protected. Excavation pits, material, or obstructions left after dark in or across pathways should be properly protected or covered.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Do not wear signal red, signal green, or signal yellow articles of clothing when on or about the track.
18. Wear trouser legs tucked into shoes or boots.
19. Do not hang clothes on roadway or railroad signs or signals.
20. Stand clear of the tracks when trains are passing and, on multiple main tracks, stand outside and clear of *all* main tracks while trains are passing. Do not rely on others to notify you of the approach of a train.
21. Give special attention to the condition of platforms and walkways. Where unsafe conditions are found and permanent repairs cannot be made immediately, make temporary repairs to correct the condition. Report the condition and action immediately.
22. Work in pairs, whenever possible, when duty requires you to be on or about tracks during extreme cold, fog, or storms. Keep watch in both directions as protection against movement of equipment on tracks.

23. Do not work in trenches or ditches over 3 feet 6 inches in depth not braced (shored) against caving, unless located in frozen ground, shale, or rock. Vacate ditches or trenches that are located close to tracks while trains are passing.

24. When working overhead use care to prevent tools and materials from falling on those below. Avoid leaving tools and materials overhead.

25. Exercise special care when uncoupling and removing rails from the track which, due to heat, derailment, or other causes, are in compression or under bending strain. These rails quite often spring out with great force and speed.

26. Do not face rail or other metal cutting operation unless actually engaged in the operation.

27. Do not place hands or feet between switch-point and rail, or attempt to clean under rail with hands, while rail is held up with bars or jack. In changing rails in track, use care to prevent rails from turning over on hands or feet. Keep hands and feet clear at all times.

Personal Protective Equipment

1. Wear goggles on all metal cutting operations.
2. Wear safety shoes.

Section XIX. HOT SUBSTANCES

Operating Requirements

See sections I to XI, inclusive, chapter 4.

Asphalts

12. Fire control equipment will be available.
13. The following precautions will be taken in unloading liquid asphalt:
 - a. As soon as the tank car is spotted for unloading, it should be secured by blocking the wheels and setting the hand brakes.
 - b. Before the heat is applied the manhole cover on top of the tank car should be removed.
 - c. When used for heating purposes, steam boilers should meet all provisions of the ASME Power Boiler Code. The boiler or heating unit should be placed at a safe distance from the tank car.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

Asphalts

17. Place heating kettles securely in a level position.
18. Reduce the applied heat when there is danger from overflowing due to foaming.
19. Extinguish fire if a dense yellow cloud of vapor arises from kettle. This is an indication that the asphalt is reaching the flash point.
20. Do not heat asphalt in close proximity to a building or to other flammable materials.
21. Dry kettles thoroughly before using.
22. Check oil-fired kettle frequently for condition of hose and relief device.
23. Avoid exposure to excessive fumes arising from hot asphalt. Stay on the windward side.
24. When using hoisting equipment in handling melted asphalt, examine it carefully to see that it is in good condition and that the hooks which carry the buckets are fastened securely to the ropes. Do not fill buckets to the top. Hoist carefully to avoid swaying, or striking objects. Stand well clear of suspended buckets.
25. When applying hot asphalt within buildings, keep doors and windows open.

Babbitt metal—heating and pouring

26. Do not prepare molten metal in a constricted working area or leave unattended.
27. Do not permit a single drop of water to fall into molten metal.
28. Keep hands, clothing, and tools dry.
29. When pouring molten lead into clay runner be certain runner is thoroughly dry.

Personal Protective Equipment

Asphalts

1. When spreading hot asphalt on road or street surfaces, wear heavy shoes with thick soles.
2. When handling asphalt being processed, take protective measure as follows:
 - a. Wear loose, heavy clothing in good condition. Wear clothing closed at the neck, sleeves rolled down over top of gloves, and trousers (without cuffs) extending well down over the tops of shoes.
 - b. Wear safety shoes.
 - c. Wear asbestos or heavy leather gloves.
 - d. Wear goggles to prevent eye burns from bubbling or splashing asphalt.

Babbitt metal—heating and pouring

1. Wear goggles and have hands, arms, and legs well covered.

Section XX. INCINERATORS

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. All loading platforms should be equipped with guard rails.
13. Suitable guard rails should be provided around charging holes, and area around holes should be kept clear of debris to prevent slipping or falling into furnace.
14. Manhole on charging well should not be opened while furnace doors are open or vice versa.
15. Screens should be provided on incinerator stacks.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Do not burn fats, greases, or oils. Place them in containers provided for such purpose.
18. Do not attempt to burn explosive or semiexplosive matter.

Personal Protective Equipment

1. Wear dark, shatterproof goggles when stoking.
2. Wear safety shoes.
3. Wear gloves when handling rough objects or damaged containers.

Section XXI. SEWAGE TREATMENT AND DISPOSAL PLANTS

Sewage gas is combustible and also explosive under certain conditions. Such gas is usually toxic and may be asphyxiating. It is therefore necessary to take unusual precautions where such gas may be present, either in the sewer system or at the treatment plant.

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Unattended visitors will not be permitted around plant.
13. Hand rails and manhole steps will be provided at convenient points to facilitate inspection of structures and to provide a ready means of exit from a tank in case of accidental immersion.
14. Sewers, sewer inclosures, and manholes will be thoroughly ventilated before entering. Rooms which contain sludge pumps, sludge lines, gas lines, and other similar equipment should be ventilated mechanically whenever practical.
15. A nonsparking, portable blower should be available for ventilation.

16. No open flame or other source of ignition will be permitted where gas is likely to have accumulated.
17. Explosives, gasoline, naphtha, and other flammables will not be discharged into the sewer system.
18. The escape or leakage of chlorine gas into confined areas should be prevented, as this gas is poisonous and acts as a powerful irritant to the nose, throat, and lungs
19. Adequate guard rails and walks will be provided around pumps, wells, and tanks.
20. After use, temporary water flushing pipes or hose will not be allowed to remain connected with sewage pipes, sludge pipes, or tanks.
21. Walks will be kept free of oil and grease, and icy walks should be cleared or covered with sand.
22. The emergency numbers of fire department, hospital, and nearest doctor will be posted at all telephones.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Because of danger of waterborne disease, avoid all "hand-to-mouth" contacts when working with sewage.
18. After any contact with sewage wash hands immediately with soap.
19. Do not enter digester or other places where gases are likely to be present without an emergency rope attached to the body and a watchful assistant stationed outside. Shoes should be free from exposed nails to prevent sparking.
20. Do not smoke or light a match in sewers or sewage inclosures.
21. Use only nonsparking tools and vapor-proof electric lights and flash lights approved for use in sewage inclosures.
22. Use care in handling chlorine cylinders. Follow instructions on tag.
23. Do not tamper with valve or apply flame, steam, or hot water to chlorine cylinders. Do not place cylinders near steam pipes or radiators.
24. Open chlorine cylinder valves slowly, leaving special wrench in place. Close valve when cylinder is empty.
25. Work in pairs when disassembling sludge or gas piping, or equipment.
26. To prevent collapse of tanks use care in removing digested sludge from the digester.

Personal Protective Equipment

1. A life line should be provided for use of persons entering man-holes, sewers, sewer inclosures, and for other similarly dangerous tasks.

2. A chlorine gas mask should be provided and so located that it is available immediately outside the chlorinator room.
3. A "supplied air" mask should be provided for use in inspection and cleaning operations of sewer manholes, digesters, or other places where gases are likely to accumulate. An all-purpose canister mask should be available for emergency use.

Section XXII. WELDING, OXYACETYLENE, AND ELECTRIC

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Compressed gas cylinders will be properly marked to identify their contents.
13. Regulators or reducing valves will be provided on both oxygen and acetylene cylinders.
14. Cylinders of oxygen should not be stored with cylinders of acetylene.
15. Gas cylinders in storage and in use should be secured in an upright position. Storage areas should be dry and well ventilated.
16. Cylinders should not be exposed to the heat of stoves, radiators, or furnaces. Where cylinders are stored in the open, protect them from the direct rays of the sun.
17. Different colors will be used for oxygen and acetylene hose to avoid interchanging.
18. Electric generators for furnishing either alternating or direct current will be well protected, both mechanically and electrically, against accidental contact on the part of the operator or others.
19. Electrode holders, as well as the connecting cable, will be fully insulated.
20. Fire extinguishers will always be readily accessible to all welding operations.
21. Welding or cutting will not be undertaken in areas where there are special fire hazards (presence of fire forbidden), nor will work of this nature be performed near flammable materials unless proper precautions are taken.
22. Where possible, flammable materials attached to or near equipment requiring welding, cutting, or brazing, should be removed. If it is not practicable to remove the parts to be welded or to move the flammable material to a safe location, a suitable shield of asbestos or other effective heat-resisting material will be provided to protect the flammable material.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Handle compressed gas cylinders carefully to avoid knocks and falls.

18. Use a specially constructed hand truck to move cylinders. Use a cylinder-carrying device whenever it is necessary to move cylinders.
19. Correct leaks of gas at cylinder valve connections immediately. The location of acetylene leaks can be determined by applying soapy water to the fittings and watching for bubbles.
20. Close cylinder valves when a cutting or welding operation is finished, and when cylinder is empty.
21. Do not use oxygen and acetylene regulators interchangeably.
22. Do not attempt to transfer acetylene gas from one cylinder to another.
23. Use only the special wrench provided for operating the cylinder valve. Open valve *slowly* by not more than one turn of the spindle at a time.
24. *Keep oxygen cylinders and fittings free of oil and grease.*
25. Do not open cylinder valves by hammering.
26. Whenever long lengths of hose must be used, take care that the hose does not become kinked or tangled and that it is protected from being run over by trucks, stepped on, or otherwise damaged.
27. Inspect all hose, at least once every week, for leaks, worn places, and loose fittings. *Never repair hose with tape.*
28. When welding on heavy work, if torch becomes overheated, cool by immersing in water. In such cases shut off acetylene gas before immersing the torch, but allow the oxygen to bubble through to keep water from entering the blowpipe.
29. Do not attempt to shut off the gas, even temporarily, by crimping or kinking the hose.
30. During welding and cutting operations, certain gases, fumes, and dusts, often poisonous, are evolved by the heat of the flame. For this reason, weld only in well-ventilated places or see that you have proper respiratory protection.
31. Do not attempt to weld or cut on tanks, drums, or other metal containers unless such containers have been thoroughly drained and ventilated.
32. Be sure that tanks, drums, and disassembled pipe lines which have contained flammable liquids are cleaned of all material and *purged of all flammable gas or vapors* before you start welding operations.
33. Inspect welding cables, periodically for poor insulation, breaks, and loose fittings.
34. Do not dip hot electrode holders in water.
35. Place screens of nonflammable material around all electric welding operations to protect the eyes of other workers from

harmful arc rays. Do not permit others to watch an electric welding operation.

36. Before performing welding operations on spray booths or ducts that may contain combustible deposits first make sure that they are free of combustible materials.

37. Shut down electrical generating equipment and turn off all gas valves if it becomes necessary to leave work.

Personal Protective Equipment

1. Wear hard lens goggles when chipping, peening, removing slag, or grinding metal surfaces or welds.

2. Wear colored goggles, helmet, or handshield for all welding and cutting operations. The shade of lens to use in any instance should not vary more than two consecutive numbers from the following:

- a. Clear lenses and filter lenses up to and including shade No. 2 filter lenses may be used for resistance welding and for stray light from nearby cutting and welding operations.
- b. Shade No. 5 filter lenses are intended for light gas cutting and gas welding.
- c. Shade No. 6 filter lenses are intended for gas cutting, medium gas welding, and for arc welding up to 30 amperes.
- d. Shade No. 8 filter lenses are intended for heavy gas welding, and for arc cutting and welding exceeding 30 but not exceeding 75 amperes.
- e. Shade No. 10 filter lenses are intended for arc welding and cutting exceeding 75 but not exceeding 200 amperes.
- f. Shade No. 12 filter lenses are intended for arc welding and cutting exceeding 200 but not exceeding 400 amperes.
- g. Shade No. 14 filter lenses are intended for arc welding and cutting exceeding 400 amperes.

3. Wear safety shoes.

4. Wear appropriate protective clothing on all welding or cutting operations. Protective means which should be employed are as follows:

- a. Flameproof gauntlet gloves, except when engaged in light work.
- b. Flameproof aprons made of leather, asbestos or other suitable material, are desirable as protection against radiated heat and sparks.
- c. Fire-resistance leggings, high boots, or equivalent, for heavy work.
- d. Capes or shoulder covers for overhead operations.
- e. Hard hats when exposed to sharp or heavy falling objects.

5. Wear the proper type of respiratory protection when—
 - a. There is danger of gases, dusts, or fumes containing industrial poisons such as lead, zinc, cadmium, fluorine, or compounds thereof, or oxides of nitrogen. (See item 31, this section.)
 - b. Under conditions of extreme heat, such as is possible in confined spaces where ventilation is inadequate.

Section XXIII. REPAIR SHOPS **(Machine and Automotive)**

Operating Requirements

See sections I to XI, inclusive, chapter 4.

General

12. Effective general ventilation will be provided in buildings where automobile or other gas engines are running. Exhausts should be properly vented to the outside. Garage atmosphere should be checked periodically for presence of carbon monoxide.
13. Special metal containers with metal covers will be provided for waste, oily rags, and other flammable material.
14. A suitable fire extinguisher will be accessible to all operations involving flammables.
15. Each power tool will be provided with an individual control switch or belt shifter easily accessible to the operators.
16. Provision will be made for frequent removal of chips, shavings, and scrap on or around machinery.
17. Wheels and saws will be operated at the safe speeds for which they are designed.

Grinding wheels

18. Cracked or chipped grinding wheels will be taken out of service immediately.
19. An abrasive wheel dresser with guard over cutters will be used in dressing face of wheel.

Drill presses and lathes

20. Only "safe" lathe dogs, chucks, and drill spindles will be used. Only counter-sunk set screws will be used.
21. Complete sanitation of cutting oils will be provided.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

General

17. In the use of hand wrenches observe the following:

- a. Select the proper wrench for the job and be sure it fits snugly.
- b. Pull on a wrench, don't push.
- c. Use wrenches with long handles when working in small recesses or near hot objects.
- d. Do not use a pipe or another wrench over the handle of a wrench to increase leverage.
- e. Stand out of the line of the tool's movement when pulling on a wrench in overhead use.
- f. When working in a stooping position or when lying on your back in close quarters be careful not to be thrown off balance or struck in the face should the wrench slip. Stand in a position so you will not be struck by the wrench if it slips or the nut or bolt loosens suddenly.
- g. Keep moving parts of adjustable wrenches clean and lubricated. Keep handles, jaws, adjusting screws, and other parts tight.
- h. The jaws of monkey wrenches should be parallel. Place the wrench so the pull will be in the direction that the jaws point.
- i. Use pipe wrenches on round objects only. Place the wrench so the teeth in the center of the jaw grip the object.
- j. Repair or discard wrenches with fractures, broken handles, springs or other parts, jaws sprung or out of shape, bent, loose, with dull teeth, or out of alignment.

18. In working with a portable electric tool, particularly when in a damp or oily place, check the insulation on extension cord. Be sure tool housing or framework is grounded.

19. Never use a soldering iron or welding torch on a liquid fuel container or tank until it has been drained, washed, steamed, or otherwise thoroughly cleaned and *purged* of all flammable gases and liquids.

20. Store waste, oily rags, and other flammable material in suitable metal receptacles provided for that purpose.

21. Block all work under which you have to work. Never depend on jacks or chain hoists alone to support the load. Place blocks as load is raised.

22. Be sure your feet and all other parts of your body are clear of passing vehicles or moving machinery when working under a vehicle.

23. Do not keep gasoline in open containers. Use a safe solvent, *never* gasoline, to clean parts.

24. Use safety grip (thumb and fingers on same side of handle) when necessary to crank engines by hand.
25. Be on guard against flashes or explosions of gasoline vapors, antifreeze solution vapors, and hydrogen from storage batteries. Keep flames, sparks, and hot surfaces away.
26. If your clothes become soaked with oil or gasoline, change them immediately. Don't risk catching on fire.
27. Never allow grease or oil to remain on floor.
28. Keep passageways free of tools and other obstructions.
29. Never consider a job complete until you have checked to make sure all the lock washers and cotter pins are in place.
30. Operate power tools only when authorized.
31. Start power tools only when they are in proper adjustment and when all safety devices are in place. Do not remove or alter safety devices.
32. Do not permit power tools to run unattended.
33. Stop power tools while listening to instructions.
34. Do not let anyone handle the starting button or lever of your machine while you are working on it, and do not tamper with the controls of a machine on which someone else is working.
35. Stop power tools when machine is being cleaned or adjusted. Use a brush to remove shavings, chips, or drillings, rather than a rag or waste.
36. Calibrate work only while machine is stopped.
37. Use machines only for the type of work intended.

Grinding wheels

38. Stand to one side when starting grinding wheel.
39. Use the tool rest. Adjust tool rest close to grinding wheel.
40. Do not grind on the side of the wheel.
41. Do not "crowd" a grinding wheel—cold wheels are particularly dangerous. Pressure should be applied gradually, giving wheel a chance to warm up.

Drill presses and lathes

42. Hold small work in a jig, clamp, or vise while drilling.
43. Do not loosen chuck or tapered drill shank unless the power is turned off. Use drift pin only in loosening chuck or drill.
44. Always remove chuck wrench from chuck before turning on power.
45. Do not hammer wrench in tightening chuck.
46. Remove material which has jammed only after spindle has stopped revolving.
47. Remove chucks and face-plates on lathes by hand and not by power.

48. Change and adjust cutting tools only while the lathe action is stopped.
49. On milling machines, secure cutter on arbor before starting machine. Tighten arbor nut by hand and not by power.
(See TM 10-445 for additional information under this heading.)

Personal Protective Equipment

1. Wear safety shoes.
2. Wear appropriate goggles when doing any work where flying material or harmful light rays might cause eye injury.
3. Wear hand protection as desirable.

Section XXIV. COMPRESSED AIR (Machinery and Equipment)

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Operating speed of compressor shall not be greater than that listed by the manufacturer.
13. Complete inclosure of compressors is desirable. Guards shall be installed on all belts, pulleys, flywheel pits, cranks, and other moving parts.
14. Air tank drain pipe-valves should be opened and tank drained at regular and frequent intervals. Where automatic traps are used they should be inspected frequently and regularly.
15. Air receiver shall not be operated without a pressure gauge and a spring pop safety valve.
16. A spring pop safety valve shall be set to blow at a pressure slightly higher than the blowing pressure of the safety valve on the air tank. If a stop valve is installed between the compressor and the receiver, the spring pop safety valve shall be on the compressor side of the stop valve.
17. All pop safety valves shall be tested at regular and frequent intervals and receivers inspected at least once a year by a qualified inspector.
18. Cylinders, valves, discharge pipes, and receivers shall be cleared at frequent and regular intervals.
19. Kerosene or any other flammable substance should not be used to soften carbon formation on valves or other parts.
20. All air lines (both pipe and hose) shall be inspected at regular and frequent intervals.
21. Where anti-freeze solutions are used in the air system, proper filters shall be installed to prevent unsafe vapors at the tools.
22. Standard fittings shall be used for making all hose connections. Makeshift connections shall not be allowed.
23. All air hammers and other pneumatic machines operating

reciprocating tools such as riveters, hammers, and caulkers, shall be equipped with a spring clip, collar, or similar device as a safety tool holder to prevent the tool from being "shot" out.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Do not operate air receiver at a pressure higher than the maximum allowable working pressure, except when the safety valve or valves are blowing, at which time the maximum allowable working pressure should not be exceeded by more than 6 percent.
18. Do not apply too much oil to air compressors. Excessive oil may increase the danger of explosion.
19. Do not use compressed air to clean machinery or to blow dirt or dust from clothing or person.
20. Never wear gloves when operating a portable air drill or reamer.
21. Never point a pneumatic machine at anyone, nor stand in front of operators of such machines, even though they are equipped with tool holders.
22. Never commit an act of horseplay involving compressed air.

Personal Protective Equipment

1. Wear goggles when doing any work where flying material might injure your eyes.
2. Wear proper respiratory equipment when free silica resulting from the operation makes silicosis a hazard, and when performing spraying operations.
3. Wear safety shoes on demolition and other operations where heavy machines are used.
4. Wear hard hats and face protection as desirable on demolition operations.

Section XXV. AUTOMOBILE SERVICE STATION

This section pertains to both military and nonmilitary vehicle servicing. However, field servicing should be guided by applicable requirements and practices as set forth.

Operating Requirements

See sections I to XI, inclusive, chapter 4.

General

12. Premises will be kept clean and free of tripping hazards. Proper storage will be provided for air and water hose, tools, jacks, water cans, and all other movable objects.
13. All paved surfaces will be kept free of loose stones or gravel. Oil and grease spots will be removed immediately from sidewalks,

driveways, floors of lubrication units, and other traversed areas.
14. In freezing weather, driveways, steps, and walks, should be kept free of ice. Slippery surfaces should be sanded, and eaves kept free of icicles.

15. Loitering on the premises should not be permitted.

16. Warning signs and barricades will be used to protect customers when construction, repair, or paint work is in progress.

17. Overhead signs should be checked frequently to see that they are secure.

Gasoline handling

18. A storage tank will be gauged before being filled to determine the amount of gasoline it will hold and to avoid the fire hazard of an overflow.

19. Fill caps, cover plates, and measuring caps should be kept tight and flush with the surface of the yard.

20. Hoses, funnels, and measuring cans should be drained and dried before being stored.

21. Empty oil barrels, cans, and other containers should be removed from the premises as promptly as possible.

22. Drums or other containers holding gasoline, alcohol, or other highly flammable liquids will be kept outside or in special cool storage. Only unopened original packages may be kept inside building. Periodical inspections for leaking containers will be made and, if "leakers" are found and cannot be made tight by tightening of bung or cap, or by replacement of a gasket, contents will be transferred to sound containers.

23. Leaky faucets, valves, pumps, or hoses will be repaired or replaced immediately.

24. Small quantities of gasoline, to be carried away, will be dispensed only in approved metal safety cans with tight covers, suitably marked.

25. If pump is of a visible flow type, gasoline will be drained from the bowl before closing station.

Greasing

27. Occupants will not be allowed to remain in the car while it is being raised on a lift.

28. If the lift is located in a building, sufficient overhead clearance will be provided for maximum extended height of lift and load.

Radiator

29. Adequate antifreeze testing equipment should be available.

Tires

30. Tire inflation pressure limits should be posted.

31. Disposal should be provided for worn out tires.

Battery

32. Operating rules covering the handling, servicing, charging, and rebuilding of batteries should be posted.

Gasoline pumps

33. Repairs, other than by regular service man, will not be permitted.

Fire protection

34. Smoking will not be permitted on the premises.

35. Fire extinguishers will be constantly checked to make certain they are fully charged and ready for instant use. Foam and soda-acid extinguishers will be protected against freezing or excessive heating.

36. If an open heater is used in the station, a screen or guard will be provided to prevent personal contact with flame or hot surfaces.

37. Open flames will not be used to test piping or other apparatus for leaks.

38. Metal cans with self-closing covers will be provided for the storage of oily rags or waste. Contents will be removed daily.

Light bulbs

39. Adequate replacement stock should be maintained.

Equipment—air compressors

40. Air compressor cylinder should be blown daily.

41. Electric control switch on the compressor should be shut off before closing the station.

42. Air compressor tank should be drained daily to remove accumulated water and oil.

43. Only oil designated for air compressor use should be used.

Car pits

44. Attendants only should be allowed in pits. Pits should be protected with suitable guard chains or rails.

45. Only properly installed and maintained vapor-proof electrical equipment should be used in pits.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

General

17. When a car is entering driveway, take a position on the pump-island or other place in the clear so that the approaching car cannot strike you or run over your feet.

18. Before working under any raised hood, or truck cover, make sure that the safety catch is securely fastened.

19. When giving service, stand so that your feet and body are clear of the car in case it starts to roll.
20. Do not try to service a moving car.
21. In cleaning windshields and doors, be careful to avoid cuts and scratches from cracked or broken glass.
22. Unless you are in a pit, work under a car only when it is properly blocked. Do not depend on jacks.
23. Remove your clothing if it becomes soaked with gasoline or oil, wash with soap and water, and put on fresh clothing. Do not put gasoline soaked rags in your pockets.

Gasoline handling

24. Never transfer flammable liquids in the presence of any flame or burning material, including cigarettes.
25. Replace taps, plugs, and bungs of drums and barrels immediately after use and when empty.
26. Report leaky faucets, valves, pumps, or hoses immediately.
27. Do not use compressed air for emptying liquid from a container.
28. Do not use gasoline *of any type* to clean automobile parts, floors, or your hands. For these purposes, use approved cleaning solvents.
29. After handling motor fuel wash hands thoroughly before eating.
30. Use extreme care when climbing on or off tank trucks.

Customer service

31. When approaching driver, ask him first to shut off his engine and set his hand brake. Drivers or bystanders should be requested not to smoke during filling operations.
32. Place hose nozzle firmly in automobile tank, making sure there is contact between nozzle and tank.
33. Make sure that tank does not overflow. Remove the hose nozzle only after flow of gasoline has stopped. Immediately replace the tank filler cap.
34. When filling gas tank located under seat, avoid touching hose nozzle to battery terminals.
35. Avoid spills by draining hose nozzle thoroughly before removing it from tank. In case of a spill, warn the driver not to start engine until the cap has been replaced and the spilled gasoline has been washed away.
36. Keep face away from fill pipe when making deliveries.
37. Fill motorcycle fuel tanks using a 1-gallon measure provided for the purpose, rather than through the delivery hose. (Driver and side-car or other passengers should alight before gasoline delivery is started.)

38. If there is a dog, cat, or other animal in the vehicle, be careful not to expose yourself to bites or scratches.
39. Keep your fingers out of car door jambs. Be careful not to shut occupant's hand in door.

Greasing

40. When guiding a car to the lubrication rack or lift, do not stand in front of car where you may be crushed. Be sure that the ignition is turned off, the gear shift is in neutral, and the wheels are blocked before starting lubrication service on a car or operating a lift.
41. Never raise a loaded truck on a lift.
42. Before lowering a lift, see that it is properly positioned, that everyone is in the clear, and remain at the control valve while the car is being lowered.
43. See that all is clear before the car is backed off the lift or pit.
44. When operating a lubricating gun, never shoot the grease at any part of the body or point the gun toward anyone else. Grease expelled from a high pressure gun may puncture the skin and cause infection.
45. Use wrenches that fit and are of proper length. Take time to use them correctly.
46. Grease on tools or on the hands may cause the tools to slip. Clean tools with kerosene or approved cleaning solvents when necessary.
47. When using a bar on springs, work the bar away from your face. Make certain your body is braced and that you have good footing.
48. When you find a transmission, differential, or crank case plug which is extra tight, be sure wrench is properly adjusted and apply pressure gradually. Be sure of good footing.
49. After lift has been raised, put safety bar in place.

Radiator

50. Do not use a lighted match to look into the radiator.
51. If the radiator is steaming, keep the motor idling, lay a large rag over the cap to protect your hands, and allow the steam to escape gradually before removing cap entirely, then add water slowly.

Tires

52. Be sure that brakes are set and ignition turned off before giving air service.
53. Inspect the tires for serious defects before inflation and determine from driver, tire markings, or maintenance instructions what air pressure is desired.
54. When inflating tires, turn head away to protect the face and eyes, in case of blow-out.

55. Use particular care when working on heavy truck tires or when any tire is badly worn or damaged. Keep hands from between dual tires when gauging or inflating. *Be sure locking rings are secure.*

56. When inflating a tire that has been removed from a truck, either securely loop a strong chain around tire and rim or lay the wheel and tire on the ground or floor with the ring *down*.

57. When changing tires, take out valve core before removing tire from the wheel or rim. Use proper tools and avoid strain.

58. Never place a tube of patching cement on a hot surface.

59. Do not permit children to use air hose.

Battery

60. Use battery servicing equipment to avoid splashing or spilling of acid.

61. Never attempt to blow off loose particles or corrosion on the top of a battery by mouth or air hose. A brush should be used. Brush away from you and keep your face as far away as possible.

62. Do not wear rings while servicing a battery as severe burns may result.

63. Keep lighted matches, cigars, cigarettes, and all open flames away from batteries.

64. Keep hands away from face while servicing battery and wash thoroughly when through.

65. Use battery tongs or other appropriate carrying devices when removing or lifting batteries.

66. Follow manufacturer's instructions when operating battery recharging equipment.

Gasoline pumps

67. If pumps are electrically driven make sure pump motor is shut off after delivery is completed. Always hang the hose up after each delivery.

68. Report a leaking pump immediately and keep it out of service until repaired.

69. Call service men to make any and all electrical repairs around pumps.

Fire protection

70. Know the location of nearest fire alarm box and have the telephone number of the fire department written down in a convenient place. Give alarm immediately in case of fire.

71. Should a fire start in the vehicle's tank while the nozzle of the gasoline delivery hose is inserted therein, leave the nozzle in the tank, stop the pump, warn the occupants in the vehicle to get out, then smother the fire with wet cloths or fire extinguisher.

72. Keep doors and windows open as far as possible while fighting fire.

73. Report defective electrical equipment immediately.

Light bulbs

74. When necessary to remove lens or light bulbs, protect your hand by using a piece of damp chamois, a heavy rag, or regular bulb or lens removers.

Equipment—air compressors

75. Turn off the motor switch before oiling, wiping or working on the air compressor.

76. Inspect the air compressor tank gauge daily to see that it is registering, that allowable pressures are not exceeded and that kick-off pressure is normal. Report at once, for adjustment, improper condition of pressure kick-off. Never tamper with adjustment of air safety valve or kick-off switch.

77. Do not hammer or tinker with a compressor tank when it is under pressure.

78. Keep clamps tight on air hose.

79. Before starting the air compressor, inspect the drive belt to see that the lacings are in good condition. Should belt slip off, stop the motor before replacing it.

80. Release all air from air hose before disconnecting from the compressor. Do this by opening the valve at the end of the hose.

Car pits

81. Use only nonflammable cleaning compounds to clean pits.

82. Keep steps to lubrication pits, or to basement, free of wrenches and other objects, and clean of grease and oil.

83. Keep pit drains clear.

Personal Protective Equipment

1. Wear goggles, rubber gloves, aprons, and boots, and special industrial type gloves as needed.

2. Wear safety shoes (steel toe caps and nonsparking soles and heels).

Section XXVI. ROCK QUARRYING AND CRUSHING

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Primary drilling will be performed only by trained, experienced men.

13. An experienced explosives man will be in charge of and exercise direct supervision over the transportation, storage, issue, and use of explosives. He will be licensed when so required by prevailing local ordinance.

14. The storage of explosives will comply with the requirements contained in FM 5-25 with regard to design and location of magazines, housekeeping in the vicinity of magazines, separate storage of explosives and detonators, arrangement to insure first use of oldest stock, repairs to magazines, and other safety precautions.
15. The magazines will be in the charge of a reliable and competent person and should not be unlocked except for inspections, and authorized storage or removal of explosives. Accurate inventories and records of issue should be maintained by such person and should be audited at periodic intervals.
16. Personnel responsible for loading and wiring charges will be thoroughly trained and will work under the direct supervision of the person in charge of blasting.
17. All explosive materials and accessories, and their handling and use, will conform to recommendations contained in FM 5-25. This includes preparation of bore holes, preparation of caps and primers, methods of wiring charges, proper use of exploders, and general safety precautions.
18. Prior to the firing of a shot, all persons in the blasting area will be warned of the impending blast and ordered to a safe distance from the area. The blast will be fired by the person in charge of blasting only when he is absolutely certain that every person has left the quarry or retreated to a safe distance or to a safe shelter, and that no one remains in a dangerous location. Equipment will be removed also to a safe distance.
19. Blasting at noon and in the evening, at which time it is possible for all personnel to be out of the quarry, should be the rule where possible.
20. Blasting machines should have removable handles or tamper-proof locks.
21. Crusher openings will be equipped with a grid which will admit large rocks but also will furnish some protection against personnel falling into the crusher. All sprockets, belts, chains, and other dangerous moving parts of the crusher, its driving mechanism, or conveyors will be completely enclosed. The electric motor used to drive a crusher will be enclosed to protect personnel from electric shock hazards and protect the motor from rock dusts. Platforms around crusher heads will have adequate handrails.
22. Overhead trestles for railway cars or conveyors will be equipped with gutter boards to catch falling material. Where required, safe walkways should be constructed. In addition, unnecessary entry into the danger area under a trestle or conveyor will be prevented by physical barricades.
23. Full mechanical guarding will be used to protect personnel. Frequent and thorough inspections and a program of preventive

maintenance should be carried on to keep equipment in safe condition and to prolong its life.

24. All electrically-operated equipment will be grounded. Electric cables to power shovel will be armored, protected from damage, and frequently inspected. Insulated tools will be provided for cable handling.

25. Power shovels, trucks, bulldozers, and similar equipment will be equipped with substantial sheet metal overhead protection for operators.

Handling, use, and storage of explosives

26. Explosives and detonators will be separately transported and stored and their proximity in the quarry during loading operations will be closely controlled, both as to distances and quantities.

27. No metal, metal tools, carbides, oils, matches, firearms, electric storage batteries, inflammable substances, acids, or oxidizing or corrosive compounds will be transported, stored, or placed in close proximity to detonators or explosives.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

Stripping and drilling

17. Strip the overburden of top soil far enough back from the quarry face so that the danger of falling material is removed.

18. Make drill holes greater in diameter than the diameter of cartridges of explosives used.

19. Do not carry on loading and drilling operations at the same time in the same immediate area.

20. Do not start drilling until all remaining butts of old holes are examined for unexploded charges. Never insert a drill, pick, or bar in such holes even if examination fails to disclose explosives.

Handling, use, and storage of explosives

21. Do not smoke or carry matches while engaged in handling or loading explosives, or while engaged in other work nearby.

22. Use only wooden wedges and wooden mallets to open containers of explosives. Never drop loaded containers for the purpose of opening.

23. Remove dynamite cartridges from containers only for immediate use. Carry them to the blasting area in nonmetallic containers.

24. Destroy all empty dynamite boxes showing stains of any kind by burning out of doors at a safe distance from magazine and other structures.

25. Do not cut or attempt to use any high explosive that is frozen.

Loading and wiring

26. In loading small diameter bore holes, tamp with a wooden stick having no metal parts. Seat primed cartridges by even, steady pressure only.
27. Check and definitely locate all loaded holes or charges before firing.
28. When holes are sprung, allow ample time between springing shots for the holes to cool, and also between the last springing shot and the loading of the main charge.
29. Do not connect firing line to a blasting machine or other source of power until the shot is to be fired.
30. Do not string blasting wires upon public utility poles, telephone, or electric wires.
31. Do not prime cartridges or load holes during approach of a thunderstorm or while storm is in progress. If a charge has been primed or holes loaded, every person should be ordered to a safe distance until the storm is over.

Firing

32. Sound a warning signal prior to the firing of a shot. Retire to a safe distance or leave the quarry, whichever is instructed. Be sure that equipment is removed to a safe distance.
33. Immediately after firing a blast, disconnect the blasting machine from the firing line and remove it from the vicinity.
34. Return to work in the quarry only after the man in charge of blasting has determined that there has been no misfire and the quarry superintendent has determined that the immediate hazard of falling or sliding rock is ended. The quarry superintendent will determine the methods of safely scaling down loose rock.
35. The man in charge of blasting will give safe procedures for detonation of misfires.

Loading and transporting stone

36. Good housekeeping on the quarry floor is essential to safety. Remove loose rock and discarded materials.
37. When working with power shovels, bulldozers, and similar equipment, know the signals used in operating such equipment. Become familiar with and avoid the hazards of mechanical equipment, such as the overhang of the power shovel and the danger of working under the scoop.
38. Do not remain in or near trucks when they are being loaded.
39. Do not overload trucks or railroad cars.
40. Do not ride trucks or cars unless you are a part of the train crew or are seated in the cab or empty body of a truck.

Personal Protective Equipment

1. Wear safety shoes.
2. Wear goggles where flying particles are prevalent.
3. Wear respirators if the free silica content of the rock makes silicosis a hazard.
4. Life lines or substantial ladders with proper landings are required for men scaling the face. The life line must be securely anchored and protected from excessive abrasion by rock surfaces over which it passes.
5. Wear gloves when handling rough rocks.
6. Wear hard hats when working near the face of the quarry and around loading and crushing equipment.

Section XXVII. STEAM BOILERS

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Steam boilers will be inspected by a qualified licensed boiler inspector and an approval certificate issued before equipment is put into operation.
13. Subsequent inspections will be made at intervals not exceeding 12 calendar months unless otherwise required. Stationary boilers which have been removed from service, repaired, or overhauled during the 12 calendar months for which approval certificates have been issued will be inspected by a qualified inspector and a new approval certificate, bearing the new date of inspection, issued. Safety valves, gauges, injectors, and other appliances attached to and used in connection with boilers will be interpreted as being parts of the boiler for the purpose of inspection.
14. Fusible plugs should be renewed frequently on all boilers.
15. Safety valves of the spring loaded type should be provided on all boilers. No stop valve should be placed between the boiler and safety valves. Safety valves should be properly sealed after being adjusted by the inspector.
16. All boiler feed lines (including hot water supply boilers) should be equipped with check valves placed as close as possible to the boiler.
17. All heating boilers should be equipped with approved blow-off cocks or valves. The blow-off should be arranged so that leakage can be observed by the operator.
18. The discharges from safety valves and blow-offs should be located so that they do not constitute a hazard to personnel.
19. Adequate ventilation should be provided in boiler furnace before burners are lighted.
20. Fires in coal or wood-fired boilers never should be started with flammable oils or other materials which might cause explosions or flare-backs.

21. Fires started in cold boilers should not be forced as this may cause boiler and setting to be unevenly heated, resulting in expansion, strain, and damage to equipment.
22. Daily inspections should be made of oil supply lines, oil pressure relief valves, oil heater steam coils, strainers, tips, valves, and burners to ascertain that they are clean and do not leak.
23. Slice-bar racks should be so constructed that men cannot walk into hot portions of bars.
24. Repairs should never be made on any boiler, steam line, or equipment while under pressure.
25. No one should enter a boiler or boiler setting until it is sufficiently cool and thoroughly ventilated. Precautions should be taken against possible burns caused by flue dust or loose parts which might fall.
26. Every precaution should be taken to see that all control valves are closed before allowing men to enter boilers. Valves should be marked with tags labeled "MEN IN BOILER."
27. Boiler should never be ordered closed until the supervisor has personally determined that all men are out and equipment has been removed.
28. Adequate ramps should be provided where it is necessary to use wheelbarrows for the removal of ashes.
29. In blowing down boilers, if the operator cannot see gauge glass, then convenient and positive signals should be arranged with a second worker who is in a position to watch gauge glass.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Do not allow oil to gather on the floor of the combustion chamber, about the burners, or in front of boiler, especially before lighting fire.
18. When lighting burners, stand clear to avoid injury from possible flare-back.
19. Stop supply of fuel immediately when a burner snaps off. See that furnace and all passages are ventilated before relighting fire.
20. Do not throw coal dust or sweepings into the fire box because of danger from flare-back from rapid ignition of dust particles.
21. Do not pile hot ashes and clinkers against the boiler front.
22. Do not leave slice-bars, rakes, and other tools lying on floor or in aisles between boilers. Place in storage racks provided for these tools.
23. When banking fires, allow sufficient draft to cause a small current of air to pass continuously through the furnace and its connections and into the stack to carry off any accumulation of combustible gases.

24. Do not attempt repairs on any boiler, steam line, or pressure-carrying equipment while under pressure.
25. Keep water gauge glasses clean and well illuminated.
26. Do not attempt to stop safety valve leakage by tightening the spring.

Personal Protective Equipment

1. If gloves are desirable for working in the boiler room, wear a size sufficiently large to slip off quickly by merely flipping the hand.
2. Wear goggles when constantly engaged in hand stoking operations.
3. Wear respirators or other desirable respiratory equipment.

Section XXVIII. FOREST WORKERS

Ordinary trimming and felling operations are covered by the following safety regulations. In addition, a completely organized program for large clearing projects is provided hereafter under section XXIX, chapter 4.

Operating Requirements

See sections I to XI, inclusive, chapter 4.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. When a ladder is used make sure the footing is secure.
18. Do not set ladders on trucks or other objects which can be moved while a man is working on the ladder.
19. Lash ladders in place at either the top or bottom, if there is danger of slipping.
20. Place ladders in racks or flat on the ground after use. Do not leave leaning against buildings or trees.
21. Before engaging in any phase of tree climbing work, be sure you know how to climb a tree properly and are familiar with the use of a safety sling.
22. Inspect every rope thoroughly for cuts and abrasions before each use. Cut out a weak section or discard an unsafe rope. Test questionable ropes by the weight of three men before use.
23. Do not climb a rope hand-over-hand without using a foot-lock or using the legs around the tree. The use of tree climbers and safety belt is preferred.
24. Observe the following for the proper care of ropes:
 - a. Use care in drying.
 - b. Prevent freezing after wetting.
 - c. Do not drag along the ground or over rough surfaces.

- d. Store in places where contact with sharp tools and acids may be avoided.
 - e. Avoid kinking, especially when the rope is wet.
25. Inspect limbs in trees when climbing before allowing the full weight of your body to rest on them. Do not trust your weight to a dead limb.
 26. Always place hands on separate limbs when climbing so that if one limb breaks the body will remain supported by the hand placed on the other limb, or around the tree trunk.
 27. Always give warning before felling a tree or cutting off limbs. The cry "TIMBER" is the common signal for this purpose.
 28. Avoid dropping limbs when there is danger to men or objects below.
 29. Take great care when working in close proximity to electric wires. Consult your superior before starting any operation where the danger of contact with these wires may exist.
 30. When limbs are dropped or resting on wires remove by means of a dry rope thrown over the branch or with long-handled pruners and gloves.
 31. Raise or lower tools by means of a hand line or the free end of a safety rope. Tools must never be thrown into a pile of rope dropped from a tree.
 32. Before felling a tree, request instructions in the proper manner for wedging and notching so that the tree may fall where desired.
 33. Do not work on the base of a tree being felled or within the radius of the tree's height if more than one workman is already engaged in that area.
 34. Once started, finish felling operations before leaving job at the end of the day or for lunch.
 35. Keep away from the base as the tree starts to fall so as to avoid unexpected rolls. Stand to one side particularly when felling leaning trees, to avoid the danger of kick-backs.
 36. Take great care when carrying or using axes. Axes should be carried grasping the handle near the blade, holding blade down and away from the body. Before cutting make certain there is sufficient clearance between you and fellow workers.
 37. The following rules for care and use of equipment must be observed:
 - a. Saws should always be kept sharpened and properly set so that they will not jump out of the cut and injure the arms or legs. Saws must be tied to the rope before a tree is climbed and then pulled up into the tree. Never climb with the saw attached to the belt. When saws are used in pruning or topping they must be securely fastened at all times, except when actually in use, by straps or rope in such a manner that they cannot fall.

- b. Never carry tools of any kind in boots or belts.
 - c. After use, place saws, ropes, shovels, picks, and all small tools inside the tool box in the place provided for each tool. Cover metal tools with machine oil when not in use to prevent rust.
38. If exposed to lightning observe the following precautions.
- a. Do not seek shelter under a tree.
 - b. If possible, get into an automobile or truck which is *not* parked in a wide open space or on top of a relatively bare hill or in any similar location where it becomes the predominating highest object in the immediate vicinity.
 - c. If it is necessary for you to remain in the open, sit or lie on the ground.
 - d. Keep away from wire fences.
 - e. Do not handle wires of any kind, including telephone and electric power lines.
 - f. Steel buildings, towers, and bridges are considered safe shelters provided a person is inside or under the steel framework and not contacting the metal.

Personal Protective Equipment

- 1. Wear safety shoes.
- 2. Wear hard hats.
- 3. Wear gauntlet gloves (when handling brush or limbs).

Section XXIX. CLEARING WOODED AREAS (Logging)

General

Experience has shown that clearing brush and standing timber from forested areas is among the most hazardous of work operations. Experience has proven also that with proper regard for safety it is possible to conduct clearing operations efficiently with a low accident rate.

The technique of clearing will vary in accordance with the size, character, and density of the timber growth, the topography, the climate, the major mission, the facilities available, and the type, skill, and experience of labor.

Safety considerations which normally enter into the formulation and execution of a satisfactory clearing plan are treated in the following paragraphs.

Preliminary Safety Survey

Prior to starting operations on any clearing job, the job supervisor or assistant in immediate charge of the field work should make a careful safety survey of the area to be cleared, in connection with formulating his plan of operations. He must bear in

mind that no plan of operations, however efficient it may appear from a purely engineering point of view, will be accepted as a satisfactory plan unless it is also a safe plan—that is, one arrived at with due regard for the safety of the workers on the job. In the safety survey, all physical conditions and factors which affect safe conduct of operations should be noted and duly weighed:

1. Size, character, and density of forest growth.
2. The presence of poisonous plants such as poison oak, sumac, ivy, or nettles.
3. The presence of briars, spines, or thorns on trees and brush.
4. Exposure of site to strong winds with attendant hazards from windfalls.
5. Conditions of ground, whether steep, rolling, flat, well drained, or swampy.
6. Character of forest floor litter, whether of fallen tree trunks, dense underbrush, creepers, boulders, wet or dry standing, or any combination of these.
7. Exposure to forest fires, sudden floods, earth or snow slides.
8. Any and all other factors bearing on the safety of personnel.

Hazards

During the physical examination of the area to be cleared particular care should be taken to identify in advance the existence of actual or potential hazards or menaces to the safety of the operating personnel. As far as practicable such hazards should be removed or reduced in advance of operations. When impracticable to do this, the hazard should be posted with a warning sign and/or wired or roped off when applicable. Other hazards may be largely neutralized by advance planning and special equipment.

1. Hazards which in general may be removed in advance include:
 - a. *Falling trees.* When suspended by trunks and branches of other trees. Lower by selected experienced men.
 - b. *Menacing trees.* Remove all unstable trees around camp sites and assembly areas which may endanger life or property by falling in winds or when weakened by insect attack, rot, rain, soaked ground, or shallow roots.
 - c. *Unstable boulders on slopes.* Remove or stabilize by digging in or blocking.
 - d. *Rotten or risky foot logs.* Remove or prohibit use.
 - e. *Unguarded foot logs or footbridges.* Provide with hand rails or rope guards.
 - f. *Unsafe bridges.* Strengthen by shoring and replacement of parts as necessary to carry the loads. Fording of heavy machinery will be desirable in many cases.

- g. Steep foot paths.* Improve, flatten, and/or provide with steps and guard rails or ropes as necessary.
 - h. Standing water.* Drain as far as practicable and provide rubber boots for wet or muddy standing. Spray for mosquito control.
 - i. Thorn bushes, trip vines, and poisonous plants.* Remove by experienced men equipped with protective clothing such as gloves, boots, and goggles.
2. Hazards which may be guarded against or mitigated by advance planning include:
- a. Dangerous holes, abrupt canyon walls or cliffs, steep slopes, land or snow slides, bogs, bridges, fords, and the like.* Post warning signs and use wire or rope guards as necessary.
 - b. Poisonous plants.* Use warning signs. Prohibit infested areas until removed by specially equipped parties.
 - c. Exposure due to improper or inadequate clothing.* See that the worker is provided with adequate and proper clothing for the climate and task required of him.
 - d. Water hazards.* Provide exposed workers with kapok jackets, life buoys, and life lines when working over, in, or dangerously near deep or swift waters.
 - e. Dangerous slopes.* Provide life lines attached to exposed workers. See that calked shoes are worn.
 - f. Drinking water.* See that it is tested in advance. Prohibit use from doubtful sources.
 - g. Poisonous insects.* Provide protective netting and special clothing as necessary. Provide kerosene to eliminate yellow jacket nests.
 - h. Snakes.* Encourage wearing of strong shoes of safety type, boots, and leggings. Provide snake bite kits to each gang leader and instruct him in their use.

Personal Protective Equipment

The safety survey should indicate the character and approximate quantity of special protective equipment warranted. This should be provided at once or requisitioned without delay. Ordinarily this would include some protective gloves, rubber boots, goggles, rope for life lines, smooth wire for guards, guards for cutting tools, climbers, safety belts, and life buoys, kapok jackets, and/or life belts as necessary. In utilizing clearing personnel, consideration should be given to men wearing safety shoes, other things being equal.

- 1. Wear safety shoes, properly calked when engaged in clearing operations.
- 2. Wear gloves when handling stones, logs, and brush, and doing such work as is likely to result in hand injuries.

Organization for Safe Operations

1. *Supervision.* Each clearing project or job should be adequately supervised by a foreman and subordinate gang leaders. The foreman and gang leaders should be men qualified by experience to supervise clearing work. Under ordinary conditions, about 20 men should be assigned to a gang leader but the number should not exceed 25.

Gang leaders should stay with the gang at all times and actively direct its work by telling each man what to do and how to do it in a safe manner.

2. *Selection of personnel.* When selection is feasible, all personnel to be assigned on clearing work should be carefully selected. Each man utilized should be questioned to determine his experience in this work. If inexperienced, the worker should be placed on the least hazardous part of the work, thoroughly instructed, and closely supervised. In no case should a clearing gang be recruited from or reinforced by the assignment of unreliable, careless, or physically defective men whose work may prove a menace to the safety of their fellow workers.

3. *Assignment of duties.* The supervisor should assign the duties of his gang leaders and cooperate with them in assigning the jobs of the various workers. The best qualified sawyers, woodsmen, and axmen should be assigned to the felling, bucking, and trimming of trees. A good grade of labor, properly skilled in the use of axes and brush tools, should be assigned to the cutting of bushes and undergrowth. Handling of logs should be assigned to men most skilled in that work. The clean-up gangs assigned the clearing of areas of debris and burning of brush may be organized from a less skilled but good grade of labor. Tool dressers should be thoroughly familiar with the sharpening and conditioning of logging tools, as the quality of their work directly affects the safety and efficiency of the job. The work of each member of the newly organized gang should be carefully observed to determine his ability to handle the work or tools assigned to him, and those found not properly qualified should be reassigned or given further instructions. Clearing gangs should, in general, be divided as follows:

Bush cutting gangs.

Tree felling and bucking gangs.

Clean-up and brush burning gangs.

Tool dresser (one to each gang of about 25 axmen and sawyers).

Methods and Procedures

1. *Bush cutting.* An inspection should be made for poisonous plants and, where these are found to be present, men who are

immune should be sent in to remove them from the area to be cleared, utilizing protective equipment. The bush gangs should then be sent in advance to cut and remove underbrush and overhanging limbs which are likely to obstruct the work of the tree fellers.

2. *Instructing fellers.* After the underbrush has been removed the gang leader, foreman, or the experienced tree feller designated by the foreman should blaze each tree over 6 inches in diameter on the side in the direction in which it is to fall. The gang leader should designate not more than two men to do the chopping and explain any hazards to take into consideration such as dead limbs, top heaviness, direction of the wind, trunk faults, dangers of kick-backs, and deflection. In each case, he should make sure that the choppers provide a good footing by removing loose stones or debris, or by cutting notches in the ground or building a small working platform when doing the chopping on the sides of hills or inclines. He should see that choppers and sawyers are properly informed as to the correct manner in which the tree is to be cut and thrown.

3. *Felling.* The felling of trees should progress inward from the edges of openings or clearings and the trees should be thrown into the cleared spaces. Fallen trees should be trimmed, bucked, and cleared before others are thrown into the same area. Trees should never be thrown against other trees or upright objects, as this may cause them to be deflected towards the fellers or other workers. Great care should be used in throwing a tree which is hung up on other trees. Whether or not other workers are near a tree about to fall, the fellers should be required to give other workers warning by shouting "Timber." In no case should men be allowed to work in areas in which timber is likely to fall. In no case should trees be felled when the wind is of such strength as to cause them to fall in the wrong direction. When trees are to be felled with lines or when it becomes necessary to remove dangerous limbs, a qualified climber should be designated and provided with long-spurred tree climbers and a safety belt, and should climb the tree with both hands free. Tools should be passed to him by line. Sufficient undercut should be made on the side on which the tree is to fall, just below the level of the saw cut, to prevent splitting and a resultant kick-back of the split section of the trunk; kick-backs cause a large percentage of fatalities on clearing work. The work should be planned so that any tree started to be felled is thrown before leaving the job and the end of the shift.

4. *Bucking.* Where trees are being sawed apart or bucked, the trunk should be scotched or propped to prevent it from dropping on or rolling against the buckers. All bucking should be done

from the uphill side of the logs when they rest on steep slopes. Fellers or buckers should not be placed where there is danger of rolling logs.

5. *Trimming.* Men trimming felled trees should be instructed carefully to guard against chopping limbs under tension when the tree is reclining. A bent-back limb, when chopped off, is likely to fly forward and strike the axman in the face. Keep log between ax and the legs as much as possible.

6. *Handling logs.* Care should be taken to place logs securely side by side in piling for disposal, in order to prevent their rolling or dropping down. Heavy logs can be best piled by rolling in the bight of ropes, cables, or chains, when man or animal power is available, or by lifting, when cranes, derricks, or gasoline engines are available. Men carrying or moving logs by hand should be provided with and use timber hooks for that purpose. Logs should be rolled away from, not towards, the body. Where teams are to be used in snaking logs, particular care should be taken not to use unmanageable or restless animals. The team should be obedient and stand under load. Lines, blocks, and hitches used in throwing trees and dragging logs should be kept in good condition. Hitches for dragging should always be made at the ends and not near the center of logs, as middle hitches are likely to cause the logs to swing. Clearing personnel, particularly teamsters and tractor operators, should be warned of the danger of dragged logs catching on limbs and saplings and causing them to be drawn back and sprung out, in some cases with sufficient force to cause fractures or serious bruises.

7. *Fires.* Fires should be built in cleared areas well away from any timber to avoid forest fires. The direction of prevailing winds should be determined and fires built to the leeward of and at a safe distance from standing timber. Log burning piles should not be left unattended. Clearing crews should be instructed against promiscuous disposal of lighted matches and cigarettes. In the zone of interior, the fire regulations of the State and Federal Forest Service should be observed strictly. Cooperation from local representatives of these agencies should be solicited as necessary.

Safety Instruction

1. *Safety responsibility of personnel.* Each member of the clearing force, when first assigned, should be informed clearly that the safe conduct of his work is a part of his duty and that no one working in a careless or unsafe manner will be considered a desirable worker. Foremen and gang leaders should be informed that the accident rate of the crew under them is part of their efficiency record and that high and unnecessary accident rates may disqualify them for such supervisory duties.

2. *Safety regulations.* A copy of these regulations should be furnished each foreman and gang leader and should be read to each gang at least once, preferably at the first gang safety meeting. The gang chief, through safety meetings and personal instruction, should carefully familiarize his men with these practices and train them to comply with applicable provisions thereof.

3. *Lifting.* All clearing personnel should be instructed as to the correct manner of lifting heavy objects. (See sec. I, ch. 4.)

4. *Falls.* Men working on clearing should be cautioned to watch their footing and to avoid walking along the edge of creeks and gullies and on logs, as serious falls from these are likely to occur.

Tools—Safe Use and Maintenance

1. *Safe use.* The use of axes should be confined to skilled workers. Axes should not be carried on the shoulder, but should be handled by grasping the handle near the blade and holding it down and away from the body. Cross-cut saws should be carried by swinging across the shoulder, teeth turned out, and grasping by the handle. Machetes should be carried in scabbards. Only thin bladed axes should be used for trimming and cutting small stock. Men using axes should make sure that overhanging limbs or other objects will not deflect the path of the tool. Personnel should be instructed and trained not to swing sharp tools toward parts of their bodies, as the tool may miss or cut through the object being struck and continue on its course, striking the person of the wielder. Axes should not be permitted to be stuck in stumps or hung on limbs and other objects. Timber crews should be required, when not using their tools, to set them aside in such manner that they will not be stumbled against, or fall on anyone.

2. *Maintenance.* The foreman or gang chief personally should examine all tools daily for defects. Those with deformed or mushroomed heads should be ground down. Split or otherwise defective handles should be replaced before further use. Handles should be kept tightly wedged in place. Sharp tools should be kept properly ground. Tool dressers should be instructed to sharpen axes by grinding from well up on the blade to the edge and not by localized grinding at the edge, as this will finally result in an abrupt angle behind the edge which will prevent the axe from biting in and may cause it to glance. The blade should not be rounded off too much. Cross-cuts saws should be kept properly sharpened, gummed, and set. The teeth of a saw may be sharp but, if not properly set and aligned, will reduce greatly the efficiency of the sawyers and cause injuries as a result of binding.

Explosives—Safe Methods for Use and Care

1. No one should be permitted to use or otherwise handle explosives unless thoroughly experienced and authorized to do so.
2. Powder men should familiarize themselves with instructions covering safe handling of explosives.
3. No fuze should be used that is less than 2 feet in length.
4. When blasting is done electrically, nothing weaker than commercial No. 6 electric blasting caps should be used.
5. When blasting is done, particular care should be taken not to overload holes or place charges in such a manner that the forces of the charge will blow out through weak areas.
6. In no case should blasts be set off without proper warning or before all persons are at a safe distance and under adequate cover. So far as possible, blasts should be set off during the noon hour or at the end of the shift.
7. Stump blasting should be performed according to approved methods which may be found in any standard blasting hand book or determined from the safety director.
8. Trees having heavy spreading lateral roots must have charges placed for that type. The occasion seldom arises where charges have to be placed for tap rooted stumps. Stumps are easier to blast out of firm and damp soils than wet soils, and allowance must be made for this in placing charges. Charges break out through most soils to form an inverted conical hole, the top of which is a little less than twice the depth. The charge therefore should be deep enough to include the stump and part of the main roots.
9. A small laterally rooted stump may be blasted by placing the charge 3 to 3½ feet below the stump using Agrital, Red Cross Extra, 20 percent, or its equivalent.
10. A large laterally rooted stump may be blasted by placing the charge under the stump at a depth one-half the root span and springing the hole so that it will hold sufficient explosive. When holes are sprung, allow ample time between springing shots for the holes to cool, and also between last springing shot and the loading of the main charge. Where blasting is done on the side of a hill, the charge should be placed in a line perpendicular to the surface of the ground from the center of the stump in order to keep the charge from blowing out the side. The above mentioned explosive should be used excepting in the case of green stumps where Red Cross, 40 percent, or its equivalent is preferred.
11. An alternative method for blasting large laterally rooted stumps which is particularly adapted to hollow stumps is to place a small charge under each of the heavy brace roots and fire all charges together with electric blasting caps.

12. The magazine should be kept securely locked and the key retained in an office for use only by a trustworthy employee who should be responsible for receiving, storing, and removing the explosives under the supervision of the employee in charge of blasting work.

First Aid—Organization

Each isolated crew or gang working in snake infested areas should be provided with a first-aid kit which contains a snake bite outfit. The supervisor or some other member of the party should be designated to render first aid as part of his work. Each member should be instructed to report for first aid for all injuries, no matter how small.

Thorns and splinters carry infection deep into punctures. These punctures close, excluding antiseptics, and often develop into serious infections. Skin punctures should be squeezed, therefore, to induce bleeding and iodine carefully worked into them. In general, a centrally located first-aid station should be established with adequate first-aid equipment (including a stretcher) and trained first-aid personnel on duty during working hours. The location should be marked with a sign.

Section XXX. MACHINE LOGGING

Where heavy timber is handled on a large scale, certain logging methods are used which introduce many very serious hazards.

Men placed on this work always should be carefully assigned. After assignment, the performance of each man should be studied carefully to determine whether he is qualified to do the work and adjustments should be made where necessary.

All phases of logging operations should be kept under close supervision. In other words, a foreman and such number of gang leaders as may be necessary to direct the operations should be present whenever work is going on.

Rigging

1. Each high rigger should be provided with a safety belt, steel core climbing rope, and a set of steel tree climbers or spurs. An extra set consisting of each of these items should be kept within reasonable distance for rescue work.
2. Spar trees preferably should be of yellow fir, red fir, or spruce. Hemlock, silver fir, or cedar also may be used but must be given additional lines. Spar trees should be inspected carefully by the group leader and must be of sound wood and of sufficient strength to stand imposed strains.
3. At no time should a climber be permitted to work alone.

4. Spar trees should be topped and limbs cut close.
5. Spar trees for high lead yarding should have not less than six top and three buckling guys. Cold decking spars, where the swing system is used, should have at least four or, if needed, six top guys, but the buckling guys may be omitted provided the spar is topped short and the high lead block is of 1-inch material. Guy lines should be fastened securely on stumps with not less than two wraps securely spiked in place.
6. Spar trees should be barked in every case where lines, straps, and blocks are placed.
7. All guy and main lines, shackles, straps, blocks, and chains should be of good materials and should be inspected carefully before being used.
8. A climber should not ride rigging, nor should anyone be permitted to work directly under a climber while rigging. While he is working in the tree, lines should not be moved except as he directs.
9. All running lines should be placed in such a manner as to least endanger the donkey operator and other workers.

Yarding

1. All running lines should be of good material and maintained in good condition. Worn and defective equipment should be replaced at once.
2. The foreman or other qualified employees designated by him should inspect each yarding system before it is put in use and should correct any unsafe conditions which become evident.
3. Running lines should be placed in such a position as to least endanger the workers and should not be so located as to necessitate men working in bight of lines.
4. In each case, a man should be designated to give signals. Each man should be authorized to give a *stop signal* in cases of emergency.
5. Men should not be required to work on or be permitted to stand close to running lines, and the "go ahead" signal should not be given until all men are in the clear.
6. At no time during yarding should more than one guy be loosened. When removing guys from tail stump, put on a safety wrap before loosening spikes.
7. Care should be exercised in making the skyline tail hold. Three full wraps should be made with staples or spikes holding each wrap.
8. Foremen in charge of yarding operations should inform their men of the following rules and see that they are obeyed:
 - a. Watch for snags, saplings, and other obstructions.

- b. When logging on the side of a hill, stand on the upper side of the road while log is being pulled, and do not dig holes or walk on the downhill side of logs that have not been adequately scotched.
 - c. Do not stand in the bight of unguarded lines or close to moving cables.
 - d. Lines should not be guided onto drums with the hands.
 - e. Make sure that logs are securely landed before loosening the choker, and do not land them in close proximity to other workers.
9. Do not climb onto or work in the vicinity of log piles unless assured that they are securely placed.

Cat Logging

- 1. Caterpillar tractors should be provided with a suitable steel guard to protect the operator from falling timber.
- 2. Cat operators should have unobstructed view of log and rigging crews and should make sure that nobody is in range of a swing of dragged log.
- 3. Pans should not be used on grades exceeding 20 percent.
- 4. Caterpillar tractors should be operated only by experienced "cat" operators.

Loading and Piling

- 1. Operators of loading machines should be experienced men. When a new operator is placed on the loading machine the foreman, by personal observation, should make sure that the candidate is qualified to do the work.
- 2. Head loaders should be experienced men and active. They should keep loading and piling operations under close supervision, actively directing the work and doing all signaling to the operators.
- 3. Each operator should be instructed that all logs should be piled or loaded securely to prevent their rolling or dropping.
- 4. Workers should be prohibited from riding lines or suspended logs.
- 5. All protruding limbs should be cleared off before moving logs.
- 6. All lines should be periodically inspected by the supervisor in charge and defective lines and equipment replaced at once.
- 7. Talking to operators of machines should be prohibited.

Section XXXI. POISONOUS PLANTS

Poison ivy, also known as poison oak, poison vine, three-leafed ivy, and poison creeper, is found everywhere in the United States except in deserts and high mountains. The poisonous con-

stituent is contained only in the sap of poison ivy. The strength of the poison is such that *tools* or *garments* which have been contaminated and *laid aside for months* can still poison the person who touches them.

Poison sumac, also known as poison ash, poison dogwood, poison elder, poison tree, poison wood, or thunder wood, grows through the eastern part of the United States. The effect of poison sumac is similar to that of poison ivy, and the rules for prevention and treatment are the same.

Operating Requirements

12. Thorough training in the identification of poisonous plants should be given.

13. Poisonous plants cleared from an area should be disposed of, whenever possible, by burying. When it is necessary to dispose of it by *burning*, however, personnel should be warned to stay well to the windward side and out of range of the poisonous vapors released by the fire.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Report immediately for first aid if you have any reason to suspect that you have come into contact with poisonous vegetation.

18. Use only treatment prescribed by the medical officer.

19. When working in areas where poisonous vegetation is present, fasten trouser legs closely over shoe tops. Do not touch gloves to the face or any other part of the body.

20. Clean tools and clothes thoroughly with a liquid or materials suggested or approved by the medical officer after working in areas where poisonous vegetation is present.

Personal Protective Equipment

1. Wear long, thick gauntlets—leather if possible—when working in the presence of poisonous vegetation.

Section XXXII. POISONOUS INSECTS

Chiggers—Chiggers, common in the Southern States, often cause serious and sometimes fatal sores.

Ticks—The two most dangerous ticks are the wood tick and the common dog or cow tick. Both may be infected with Rocky Mountain spotted fever and also rabbit fever in the Southern and Eastern United States. The presence of heavy infestation in localized areas is not necessarily alarming since only a small percentage of ticks are infected in areas where the disease occurs.

Operating Requirements

1. Thorough training in the identification of poisonous insects should be given.
2. Personnel, operating in the woods, should be instructed that during noon hour or other convenient times, clothing and accessible parts of the body should be inspected and all insects removed. Upon returning to lodgings, they should undress and inspect thoroughly their bodies and clothing and remove and destroy immediately any insects found thereon. It is important that ticks be removed within a few hours. *Prompt removal is the best prophylaxis.*

Safe Practices

17. Prior to entering any area where either or both of these insects are found, report to the medical officer for protective treatment.
18. In removing ticks from the body, use tweezers if available. *Do not crush* the tick on your body or between the fingers. Grasp the tick firmly, pinching the skin to form a hump by applying gentle but firm traction. Do not use force. A slow, steady pull is required. An application of a few drops of turpentine, kerosene, or gasoline between the skin and the under surface of the tick will kill the tick in a few minutes. After the tick is removed, carefully destroy it by dropping into a toilet, burning, or crushing on the ground.
19. Wash hands with soap and water after handling ticks and apply an antiseptic to the bites.

Section XXXIII. POISONOUS SNAKES

Rattlesnakes, copperheads, moccasins and coral snakes are the four poisonous snakes found in the United States. These snakes, when striking, inject a venom through two long grooved fangs. The absorption of this venom into the blood stream is sometimes fatal.

Operating Requirements

1. In infested regions, every group of workers should be provided with a first-aid, snake-bite kit and trained thoroughly in its use.
2. Any individual bitten by a poisonous snake should be kept as quiet as possible, given first aid for snake bite by a competent person, and taken to a medical officer immediately.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Watch where you are going and be on the alert for snakes.

18. Exercise care in putting hands into thickets, brush piles, or invisible places when climbing cliffs or ledges.

Personal Protective Equipment

When working in thickets and swamps wear sufficiently heavy clothing about the legs to protect them from snake bite.

Section XXXIV. ELEVATOR OPERATION

Although applicable to all power elevators, the following operating requirements and safe practices are limited generally to operation of the types of passenger and freight elevators commonly used in commercial and industrial structures. They are not intended as a specification for installation of new equipment, nor as a manual for skilled elevator inspectors and mechanics.

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. A detailed inspection of all passenger and freight elevator installations should be made at least quarterly.

13. Cables, guides, and all parts of machinery should be kept well lubricated. The oil in bearings and gear casings should be renewed every six months.

14. Elevator hoistways pits and cars should be kept clean. No rubbish should be allowed to accumulate therein, nor should any part be used for storage.

15. No wire or current-carrying device should be substituted for the proper fuse or circuit breaker in an elevator circuit.

16. Load limit should be posted in the car of each elevator.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. Make a trial inspection trip each morning before carrying passengers.

18. Do not permit passengers to enter or leave car while it is in motion.

19. Require passengers to stand facing the front of car.

20. Close and lock hoistway doors or gates before starting car. Stop the car at the landing level before opening the hoistway door or gate.

21. Keep car gates closed while car is running. Where no car gates are provided, keep passengers away from the open edge of car platform.

22. Limit number of passengers or freight load to the posted load limit, distributing weight evenly.

23. Familiarize yourself with the emergency devices, understand their function, and know how to operate them.
24. Never leave the car in the ordinary course of operation nor leave the operating mechanism unprotected. When going off duty for any reason, even for a few minutes, if not relieved by an authorized operator, be sure that the power is disconnected or that the operating mechanism is locked and the hoistway doors are closed.
25. When the car is not in use, take it to the bottom landing and lock it. Lock the car, controlling device and shaftway door, and turn the keys over to authorized personnel.
26. Observe all manufacturer's operating instructions carefully.

Personal Protective Equipment

1. Wear hand protection to avoid skin abrasion.
2. Wear safety shoes if required to handle freight.

Section XXXV. JANITORING

Operating Requirements

See sections I to XI, inclusive, chapter 4.

12. Adequate storage will be provided for janitor and sanitary supplies and equipment.
13. Separate storage will be provided for cleaning materials such as lye, soap, and metal cleaner.
14. All cleaning materials will be properly labeled.
15. Nonslip floor finishes should be provided for use where ordinary wax surfaces present a slipping hazard.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

17. When handling waste materials be on the lookout for sharp objects such as broken glass, pins, and razor blades.
18. Report all dangerous-looking window sash chains and broken window panes. Post "Don't open" or "Out of order" signs as necessary. If there is danger of a broken window glass falling, remove it carefully.
19. Before cleaning woodwork or walls, examine surfaces for protruding nails, tacks, and splinters, and remove them.
20. When cleaning floors observe the following:
 - a. Clean floors when traffic is lightest. If this is not practicable, rope off the area.
 - b. In large areas, flush only part of the floor; clean this, then proceed to another part.
 - c. If necessary to remove objects, place them where they can-

- not become stumbling hazards. When the floor is cleaned, return them to their proper places.
- d. When soap or soap powder is used, see that it is dissolved completely. Be sure to rinse off with clean water all soapy film remaining after the washing process. This is important particularly on or about stairs or ramps, on steel, tile, terrazzo, marble, and other hard surfaces. Repeated rinsing may be necessary.
 - e. After cleaning is completed, go over every part of the floor with a dry mop and remove all water. Dry thoroughly the space about machines, work benches, stairs, and ramps.
 - f. Remove from floor area, and store, all mops, pails, and other cleaning equipment immediately upon completion of the operation.
21. When waxing floors, observe the following:
- a. Clean surface thoroughly.
 - b. Apply wax thinly and evenly.
 - c. Allow wax to set at least 45 minutes before buffing.
 - d. Do not overbuff.
 - e. Do not allow traffic over area being processed.
 - f. Do not apply wax on stair steps, sloping floors, door sills or runways.

Personal Protective Equipment

- 1. Wear gloves when handling waste containers and other objects which might cause hand injuries.
- 2. Wear knee protectors when working in kneeling position.
- 3. Wear nonslip foot wear when working on wet floor surfaces.
- 4. Wear safety belts when washing windows on the outside (ladder and scaffold work excepted).
- 5. Wear rubber gloves when working with strong cleaning solutions.

CHAPTER 5

PHYSICAL CONDITIONING

Section I. REQUIREMENTS AND PRACTICES (General)

Personal injuries are incompatible with the whole intent and purpose of the physical conditioning program. Safety, therefore, is essential to a satisfactory conditioning program.

Operating Requirements

The lay-out, construction, and maintenance of physical conditioning and recreation areas should include the following basic safety considerations:

Location

1. Location of the area should be such as to avoid conflict with adjacent training activities. Most competitive games require a field lay-out which avoids or minimizes hazards, such as sun glare, electric light glare, or unavoidable proximity to adjacent structures.

Playing surfaces

2. Playing surfaces require the following qualities, dependent on the type of activity: resilience; good drainage; nonslip characteristics; freedom from dust; nonabrasiveness; freedom from holes, stones, or other obstacles. These qualities must be extended off the playing area wherever the activity might lead a contestant. Where the area is being used for several activities, each should be zoned for safety by the use of markers. Wax placed on a floor for other activities should be removed by the use of a standard floor cleaner or by applying mild caustic soap and hot water, before using for gym classes or athletics.

Apparatus and equipment

3. Apparatus and equipment which cannot be removed, such as bleachers, chairs, dugouts, wall apparatus, or other equipment not necessary to the conduct of the game, should be located at safe distances from the activity or protected by mats or other suitable covering. The quality, use, and maintenance of apparatus or equipment must be a safety responsibility of the activity supervisor.

Selection of participants

4. Participant selection in athletic contests should include consideration of size, weight, physical stamina, and dexterity of each individual making up the group, equalizing these factors as much as possible where two or more games are to be played.

Persons with physical impairments that prevent participation in strenuous games should be permitted to take part only in activities for which they are fit.

Games which demand unusual and quick use of the player's body should be preceded by a short warm up session. Enforcement of a conditioning program will do much to eliminate the large number of sprains, strains, or injuries that otherwise occur.

Supervision

5. Accident prevention in physical conditioning is dependent largely upon well developed and efficient supervision. The physical training program should provide the individual with an opportunity for sound body development with a minimum of risk to himself. It can be attained only through constant attention to individual guidance, the teaching of game technique, close direction of contests, proper selection of contestants, elimination of physical hazards, and a sincere concern for the protection and welfare of the individual. Supervisory personnel should be impressed with the fact that safety is their definite responsibility in the conditioning program.

Horseplay in athletics and physical training is an all-too-frequent source of injury. Horseplay decreases as interest in the play increases and adequate outlet for energies is provided. Supervision, therefore, should be aimed at increasing the quality of the game, with direct attention given to horseplay as the need arises.

Nonscheduled athletics

6. Athletics originating spontaneously in the men outside the scheduled program should be encouraged as a body building recreation. Such athletics ordinarily are unsupervised, and the hazards due to lack of supervision often cause injuries. Officers and noncommissioned officers, particularly the latter, should observe unscheduled athletics and note and correct hazardous conditions. Refereeing or umpiring by one of the group of players is to be encouraged.

Safe Practices

See sections I to XVI, inclusive, chapter 4.

Each sport has its own special techniques. It is the supervisor's responsibility to teach participants how to play in a manner best calculated to avoid injury. Although specific techniques are different for different sports, certain of the following general principles may be applied to all:

17. Whether taking a punch, catching a ball, or being tackled, always "give with the blow."

18. Fall correctly. When going down, do not sprawl; pull in the chin, arms, legs, and fall with rolling action.
19. Keep all action pertaining to the game within vision. To be aware of impending contact is to be prepared for it.
20. Protect the head from direct contact.
21. Carry the weight on the leg away from an impending contact.
22. In landing from a jump, keep the knees and hips bent slightly so that they can give with the shock.
23. Avoid violating common sense principles of endurance to the detriment of health and subsequent physical condition.

Personal Protective Equipment

Wear personal protective equipment wherever experience has shown its need. For example, in baseball the catcher should use mask, chest protector, cup support, shin guards, and a catcher's mitt. In football each player should wear shoes, helmet, shoulder pads, and hip pads. When the apparent hazards of any game require the use of personal protective equipment, and such equipment is not available, other games such as touch football or soft ball should be substituted.

Section II. SPORTS AND GAMES (Check List)

The following check list may be used as a practical inspection guide covering hazards most generally encountered in major athletic games:

Calisthenics

1. Progressive conditioning should be observed both daily and during the entire training program.
2. Horseplay should be avoided.
3. Shoes and clothing adapted to the type of activity should be worn.

Baseball

1. The diamond should be leveled generally and should be free of rocks, loose gravel, holes, obstructions, fixed objects, or equipment not actually in use.
2. Bleachers should be of safe construction and properly screened.
3. The player's bench should be located outside the area of such hazards as foul balls, flying bats, and other dangers.
4. Bags on bases should be attached to ground. Steel or wooden stakes to which bags are anchored should never be allowed to protrude above the ground.
5. Sun glasses or other protection against sun glare should be provided for fielders.

6. Complete catcher's protective equipment should be used. All players should wear appropriate playing gloves or mitts.
7. Teams should not be overmatched.
8. Instructions should be given in sliding technique. Head-on slides should be discouraged. Once decided upon, the slide should be executed without hesitation.
9. Playing areas, and areas for use of "on deck" batters, and coaches, should be marked distinctly, and no persons other than actual participants of the game allowed in them.
10. Crowding the plate to confuse the pitcher should not be allowed. "Dusting off" by pitcher to force batter away from plate should not be allowed.
11. Guiding hand should be kept away from hitting surface of the bat when bunting.
12. Batter should step out of box during plays at home plate.
13. Fielders should keep eye on the ball at all times.
14. When receiving the ball, bare hand should be kept closed until ball is in the mitt.
15. Fungo batting should be done so that infielders will not be exposed to hazard.

Football

1. Local ground rules should provide for safety if the playing area has unprotected obstructions.
2. Blocking and tackling should not be done when players are not equipped with head guards, shoulder guards, hip guards, and regulation football shoes. Touch ball, speed ball, or other games with less body contact should be substituted.
3. Clothing which may cause injury when in contact with others should not be worn.
4. Instructions in blocking and tackling should be provided before scrimmage is permitted.
5. Close officiating is necessary to eliminate unnecessary roughness and to keep touch football from becoming a blocking game.

Boxing

1. Ring should have minimum dimensions of 20 by 20 feet.
2. Ropes of ring should be spaced at 24 inches, 36 inches, and 48 inches, and should be wrapped and kept taut at all times.
3. Padding for ring posts should be provided.
4. At least 2-foot clearance around ring should be provided.
5. Resin should be provided to prevent slipping.
6. Glove weight should be inspected carefully and frequently.
7. Gloves should be inspected carefully and frequently for tears, condition of padding, and sanitation.

8. Opponents should be matched according to weight, size, and ability.
9. Individuals' conditioning and physical ability should be supervised closely.
10. Officiating should be supervised closely.
11. Bouts should be stopped too soon rather than too late.

Wrestling

1. A large canvas-covered mat should be used at all times.
2. Area surrounding mat should be free from obstacles.
3. Opponents should be matched according to weight, size, and ability.
4. Mat should be cleaned frequently.

Basketball

1. Backboard braces should be padded when located adjacent to playing space.
2. Protection for radiators or other building heating devices should be provided.
3. Well-fitting shoes and sweat socks should be worn.
4. Weak ankles and knees should be protected by taping, braces, or pads.
5. Individuals with poor vision should be provided with eye glass protection.
6. Teams should be matched closely according to age, size, and ability.
7. Officiating should be strict to keep the game under control and avoid unnecessary personal contact.
8. Substitution and time out should be provided to avoid excessive strain.

Handball

1. Playing surface should be resilient and nonslipping.
2. Sufficient space should be provided beyond sides and ends.

Soccer and Speedball

1. All player and equipment safety rules, as specified in official players manuals, should be observed.
2. Properly fitted shoes and sweat socks should be worn.
3. Officiating should be strict to control unnecessary roughness.
4. Instructions in use and control of ball by feet and head should be provided.

Swimming and Diving

1. Surface along sides and edges of pool should be nonslippery.
2. Diving board should be located where water depth is adequate

and no subsurface obstacles are present. Pools having varied depths should have all depths indicated.

3. Running or games adjacent to water lines should be prohibited.

4. Supervision on trial swims, where participants' capabilities are not known, should be strict.

5. Swimming alone, except in emergency, should be prohibited. For group swimming, the "Buddy" system, whereby swimmers are paired off and each made virtually responsible for the other, is recommended.

6. Swimming in pools, rivers or other bodies of water known to be unsanitary should be prohibited.

7. Diving into a body of unfamiliar water should be prohibited.

8. Water, especially cold water, should be entered by degrees.

9. Calls for help should never be uttered in the spirit of fun.

10. Sun bathing should not be indulged in too long or too often. Bad burns require the services of a physician.

Horseshoes

1. All rough edges or splinters should be filed from shoes.

2. Courts should be maintained regularly to prevent rolling and bouncing of shoes.

3. Playing should be prohibited after dark, except where artificial lighting is provided.

4. In singles, player should stand away while opponent is pitching.

5. Player should be sure court is clear before pitching.

6. Player should be sure that all shoes have been thrown before picking up.

Table Tennis

1. Tables should be erected where there is sufficient room at the ends and sides.

2. Splinters should be removed and other unsafe table surface conditions corrected.

3. Proper lighting should be provided.

4. Proper protection for radiators or other building heating devices should be provided.

Bowling

1. Balls with finger holes which are large enough should be selected.

2. Hands should be wiped before each throw.

3. Ball should be thrown only after preceding ball has been returned to rack.

4. Instructions should be given in proper footwork.

5. Skin abrasions on hands should be protected.

APPENDIX

REFERENCES

Other official publications of interest to personnel engaged in safety activities:

- ASF Manual M-805, -- Safe Work Practices for Prisoners of War (German).
ASF Manual M-806, --- Safe Work Practices for Prisoners of War (Italian).
AR 850-15, ----- Miscellaneous, Motor Vehicles.
AR 850-20, ----- Miscellaneous, Precautions in Handling Gasoline.
FM 21-22, ----- Watermanship.
TM 3-250, ----- Storage and Shipment of Dangerous Chemicals.
TM 5-225, ----- Rigging and Engineer Hand Tools.
TM 5-226, ----- Carpentry.
TM 9-867, ----- Maintenance and Care of Hand Tools.
TM 9-1900, ----- Ammunition, General.
TM 9-2834, ----- Machine Tools, Preventive Maintenance Procedures (when published).
TM 9-2852, ----- Instruction Guide, Welding Theory and Application.
TM 10-445, ----- The Machinist.
TM 10-466, ----- Handling of Petrol and Products (when published).
TM 10-590, ----- Hand, Measuring, and Power Tools.
TM 21-300, ----- Driver Selection and Training.
TM 21-302, ----- Operator Selection and Training: Materials Handling Equipment.
TM 21-305, ----- Driver's Manual.
TM 38-402, ----- Storage in The Zone of Interior (when published).
TM 38-402-1 ----- Storage and Handling of Hazardous Supplies (when published).
TM 55-310, ----- Stevedoring.
OO Form No. 7224,¹ -- Ordnance Safety Manual.
Corps of Engineers,² -- Construction Safety Manual.

¹ May be requisitioned directly from Office, Chief of Ordnance.

² May be requisitioned directly from Office, Chief of Engineers.

